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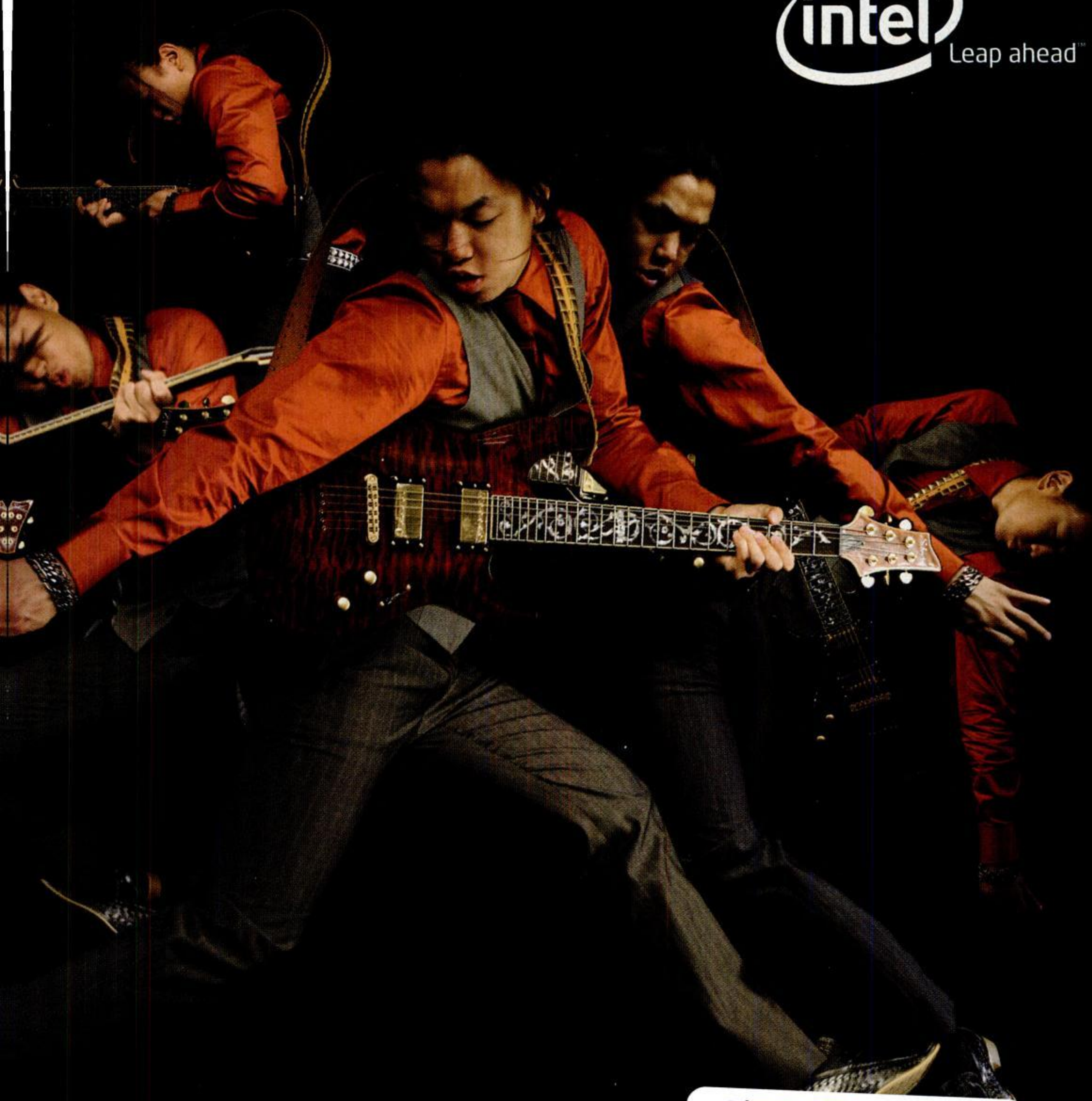

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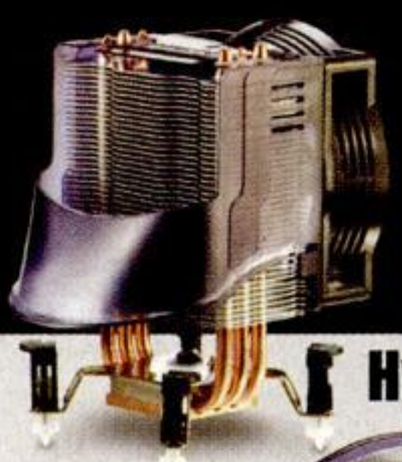

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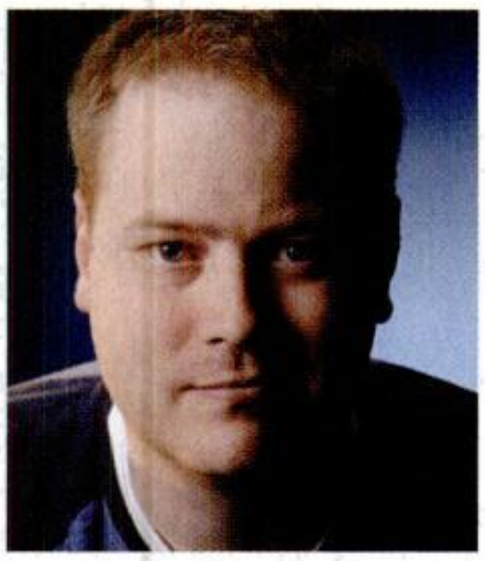

About Blogging...

Please send feedback and Rolos to will@maximumpc.com.

Since the dawn of the blogging era, I've been of the opinion that blogs should be highly targeted affairs, honing in on specific, well-defined topics to maximize the hard benefits for readers. I've wanted nothing to do with the self-centered ramblings of the typical diarist blogger. I built my own blog as a place to write about games, including those console-only titles that I can't write about as a *Maximum PC* editor. I had a small cadre of regular readers, and we had some fairly interesting (and occasionally heated) discussions about game design.

Eventually, as is the way with 99.99 percent of blogs, I stopped posting. I began spending most of my time playing just one or two games, so I just stopped writing. By the time I disentangled myself enough to play other games and was ready to start blogging again, I'd moved to a new host, and broke nearly everything on the site, virtually guaranteeing the blog's death.

However, the real reason I stopped posting was that the limited framework I'd established for myself—writing only about games and game-related topics—got boring. (There's probably an important life lesson there). About a month ago, on an unseasonably cold Sunday afternoon, the blogging urge struck me again, and I installed *Wordpress*, registered a new domain, and decided to give the whole thing another go, without artificially limiting myself.

I've realized two things from my "write about anything" experiment. The first thing is that to everyone but me, I'm a pretty boring dude. No surprise there. The thing I didn't expect is that even though I spend a lot of time thinking about "stuff," writing about it really helps me crystallize my thoughts—whether I'm writing about some new bit of tech, my current favorite game, or a book I just read. The benefits for me are clear. The difference between this new round of blogging and the initial one are simple—before I was posting for my readers, but this time... *it's personal*.

TRANSITIONS

This issue marks Josh Norem's last month as a contributor to *Maximum PC* (at least this go 'round). Josh has been a fixture at *Maximum PC* for the last six years—minus a brief stint at *Motorcyclist*. While we'll definitely miss his contributions to the mag, more than anything else, we'll miss seeing his bright, shining face (and truly astounding collection of cat shirts) in the Lab.

Will Smith

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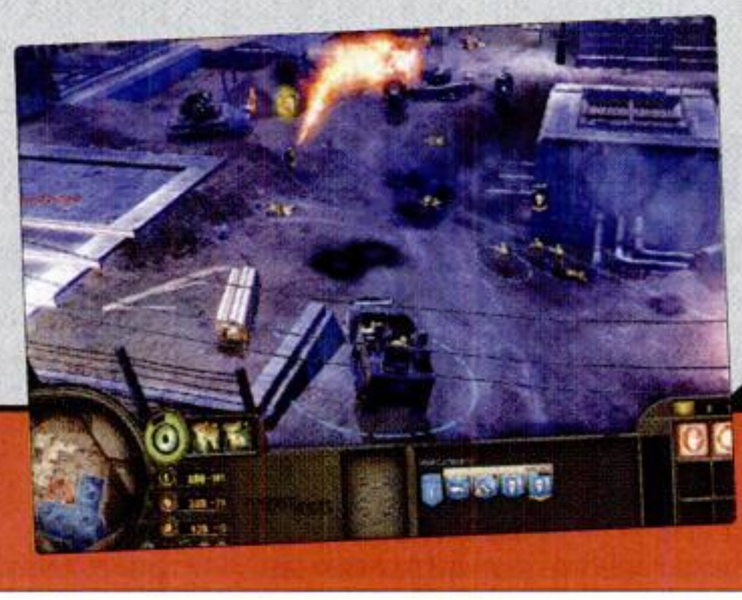

Gaming

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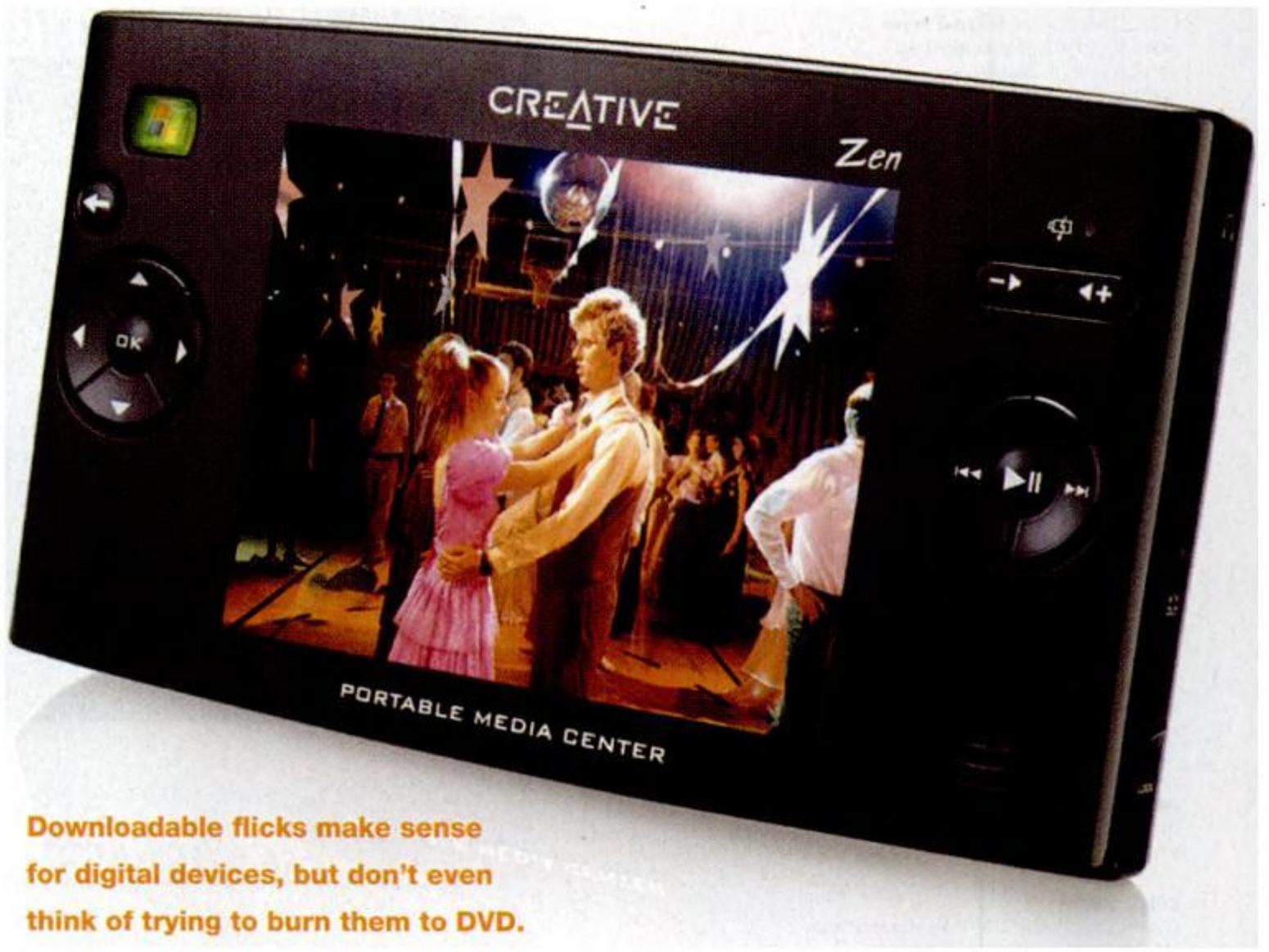
Showtime Showdown

You've heard the hype: Download movies in just a few minutes and watch them anywhere, anytime, without even schlepping to the mail-box to fetch 'em. Now here's the ugly truth about Internet movie services



Downloadable flicks make sense for digital devices, but don't even think of trying to burn them to DVD.

When Amazon quietly launched its Unbox movie download service on September 8, it caused a quick flurry of posts in the blogosphere. Instant downloads! Rock-bottom prices! Replace your entire DVD collection! A few days later, on September 12, Apple chimed in with its own announcement: iTunes movies as low as $9.99! Then the excitement faded, and nothing much changed.

DRM DISASTER

The sad truth about Internet movie downloads is that unless you've got a whole lot of time on your hands and a mess of unusual hardware in your living room entertainment center, it's just not nearly as convenient as a good, old-fashioned DVD rental from Netflix or, for you greybeards in the bunch, Blockbuster. Why? Digital rights management.

Movie studios fear nothing in the universe as much as releasing their products into the wild without first chaining them head-to-foot in restrictive DRM software. And the only way they can rest assured that otherwise law-abiding consumers won't turn their home PCs into underground movie distribution centers is to prevent them from burning even one copy to DVD.

So no matter which of the four major movie download services you buy from—be it Amazon, iTunes, CinemaNow, or MovieLink—you'll never get the convenience of burning a disc and popping it in your DVD player. Instead, you'll have to settle for some far less satisfying option, such as streaming the video from a Media Center PC to an Xbox 360 in your living room, or hooking up a PC or notebook to your home entertainment center. And while we generally love the notion of putting a PC in the living room, in this case, the inferior quality of the downloadable films means it'd hardly be worth your while.

QUALITY CONTROL

While all the major video download companies claim to offer quality at or near that of a DVD, those claims tend to crumble under close scrutiny. For instance, Apple touts its resolution (640x480), while Amazon heralds its bitrate (up to 2,500Kb/s, varying from movie to movie). But video quality depends heavily on the codec used to encode it, and the output from a given bitrate or resolution varies widely from one codec to another.

The real proof is in the viewing experience, and that's where movie downloads fall short. Movie downloads are so dependent on your PC, that only the kids with the best hardware can count on a reasonably consistent viewing experience. In our Unbox tests, we needed at least a gig of RAM to watch an entire movie without skips and lags, which is a far cry from the unthinking simplicity of the DVD player already hooked up to your TV.

Make no mistake: We love video on demand. But the fact is, this technology is already streamed straight to your living room by existing services, as many cable providers already offer on-demand delivery. And what you can't get instantly, you can get in a day or two through Netflix for a fraction of the cost of a download service, and without the DRM hassles.

MOVIE **DOWNLOAD** SERVICES

	CinemaNow	iTunes	MovieLink	Amazon Unbox
VIDEO FORMAT	WMV	H.264	WMV	WMV
RENTAL PRICES	$4 new releases / $3 older movies	None	$4 new releases. Older movies vary, some are free	$4 new releases. $2 to $3 older movies
RENTAL PERIOD	30-day storage period/ 24-hour viewing period	None	30-day storage period/ 24-hour viewing period	30-day storage period/ 24-hour viewing period
PURCHASE PRICES	None	$10 to $15	$10 to $20	$2 to $18

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Poker Penalty

DOJ takes VISA all-in to thwart online gamblers

After a second British bookmaker fell prey in September to American anti-gambling laws, poker players on both sides of the pond have good reason to fear for the future of their online antes. The arrest of Sportingbet.com CEO Peter Dicks follows on the heels of the DOJ nabbing BetOnSports chief executive David Carruthers as he stopped over in New York en route from Costa Rica to the UK in July. Both men were arrested under the U.S. Federal Wire Act for letting Americans place bets at their oversees gambling sites. But the arrests are just one way the Department of Justice is trying to hamper Americans' online gambling habits.

In its latest move, the DOJ has threatened to bankrupt VISA and MasterCard if they continue to let customers use their credit cards at gambling sites. American gamblers have responded by turning to offshore firms such as NeTeller (www.neteller.com) and FirePay (www.firepay.com)—UK-based equivalents to PayPal—in order to place their wagers.

China vs. Wikipedia

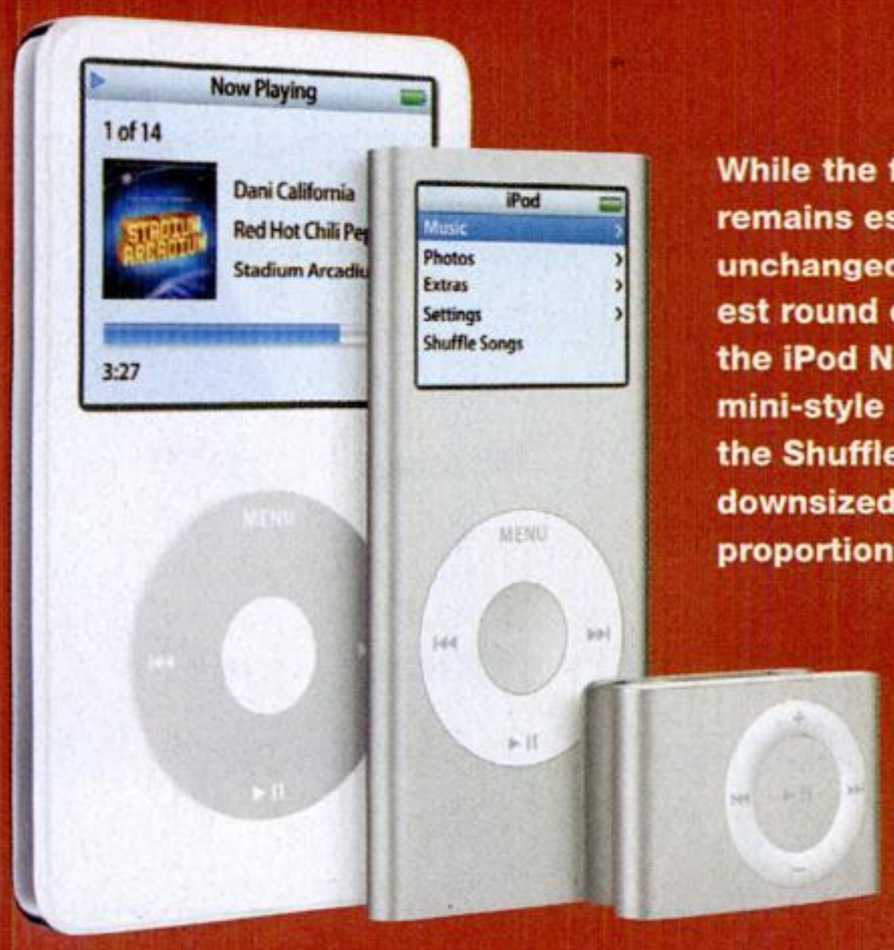
On the Internet, truth may be subjective. But that's no reason to censor it, according to Wikipedia founder Jimmy Wales. He defied orders from the People's Republic of China to censor "politically sensitive" content on the world's most democratic encyclopedia. In doing so, Wales has refused to cave in where larger online companies, such as Google Yahoo, and even Microsoft, have buckled.

"We occupy a position in the culture that I wish Google would take up," said Wales, "which is that we stand for the freedom for information, and for us to compromise I think would send very much the wrong signal: that there's no one left on the planet who's willing to say, 'You know what? We're not going to give up.'"

Right on, Jimmy! We only wish more powerful companies had the same courage of their convictions.

Meet the New 'Pod Squad

New iPods, just in time for the holidays? Who woulda thunk it!



While the full-size iPod remains essentially unchanged in the latest round of updates, the iPod Nano gets a mini-style makeover, and the Shuffle has been downsized to Lilliputian proportions.

TOM HALFHILL

The Debut of Magnetic Memory

Freescale Semiconductor—a two-year-old spinoff from Motorola—recently made headlines when investors bid $17.6 billion for the company. It's the largest wad ever offered for a technology firm. But the headlines buried more interesting news: Freescale has introduced the world's first commercial MRAM chip.

MRAM is magnetic or magnetoresistive random-access memory. In basic function, it's similar to the DRAM plugged into your motherboard or the SRAM in your microprocessor's cache. But MRAM is nonvolatile—it retains data when powered down—and works on a completely different principle. Instead of using transistors to encode binary bits, it uses magnetism on a subatomic scale. MRAM encodes a one or zero using the "spin state" of a single electron.

Electron "spin" is a fundamental property, like an electron's negative electric charge. The important difference is that spin can vary between two different states. It's possible to detect the state and alter it at will. For convenience, scientists refer to the spin states as "up" and "down," but don't take these terms literally. Electrons don't really spin, because they are dimensionless objects with no axis. These terms are merely abstractions that make quantum mechanics a little easier to understand.

The key point is that an electron's spin state can represent a binary bit. "Up" can represent zero, and "down" can represent one. To alter the state, an electrical pulse flips the electron. This application of quantum technology is called spintronics (spin transport electronics).

Enough of the science lesson. What matters is that Freescale's spintronics memory chip really works and is commercially available for about $25. The new MR2A16A stores only four megabits (512KB), so it's rather expensive, but it's a good start.

MRAM is nonvolatile, like flash memory. But flash has a limited lifespan and is vulnerable to "soft errors" caused by radiation and cosmic rays. MRAM is immune to those errors and never wears out. MRAM is much faster than flash when writing data, but for now, it's slower when reading. Theoretically, MRAM can be denser than existing memories, because the spintronic metal layers are stackable.

MRAM probably won't appear in consumer products right away, but it heralds a spintronics revolution that could dramatically change the future of electronics.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

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GAME THEORY

THOMAS MCDONALD

Game Over

"It's the first thing to make me feel normal since I've been here," my friend Charlie told me one day.

The "thing" he was talking about was computer games, and "here" was the Respiratory Rehab Unit at St. Clare's in Dover, NJ. Charlie had been attached to a ventilator for a year when we finally got him a laptop computer and a pile of games. He was an award-winning horror and fantasy writer (under a number of different names, the most famous being his own, Charles L. Grant), and we hoped the computer would get him writing again. It did, a little. But it was the games that made the real difference.

Our friendship was based on a lot of things, but we always came back to games. My first break as a writer for major magazines was a strategy piece on *Civilization.* Charlie and I had been obsessing over *Civ*. He was getting creamed, so I wrote up some strategies for him. The piece turned out pretty tight, so I sent it to a couple of game magazines, and they both hired me to write that same week.

As he steadily sunk into the early stages of COPD (chronic obstructive pulmonary disease), he was unable to work as much, and he spent hours playing *Sid Meier's SimGolf* before he was permanently admitted to the hospital. After long months attached to a ventilator that would breathe for him the rest of his days, he finally got to play games again. He was as truly happy as he'd been since he got there. In his two remaining years, he got to play *Civilization IV, Locomotion, RollerCoaster Tycoon 3, Stronghold 2, Age of Mythology*, and more of the strategy games he loved. On a particularly hard day, news of *Sid Meier's Railroads!* cheered him considerably. I came back from a visit to Firaxis with a copy of *Sid Meier's SimGolf* signed for Charlie by the man himself, and it held pride of place in his hospital room till the end.

The end finally came this weekend, far more suddenly than we had expected. He never got to play *Railroads*, but I get the feeling he'll be with me when I finally do.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

Graphics a Go-Go

ATI and Nvidia duke it out for mobile supremacy

Hot new handsets like Motorola's MOTORAZR Maxx will sport high-end GoForce GPUs from Nvidia.

The next time you contemplate upgrading your PC's power supply to accommodate a big, hot, power-hungry graphics chip from ATI or Nvidia, you might wonder how these same companies manage to also manufacture ever tinier and cooler GPUs for handheld devices—processors that sip, instead of guzzle, juice.

Of the two graphics giants, ATI has been in the mobile game longer, having shipped 100 million of its Imageon processors to date. But Nvidia is coming on strong, with recent design wins for its GoForce series in Motorola, Kyocera, and Samsung phones.

Games, digital cameras, and music are today's killer mobile apps, and the pocket processors from both companies are capable in these areas. But as cellular network performance increases, DVB-H (digital video broadcasting for handheld devices) will continue to grow, requiring ever faster mobile graphics hardware.

Sonos 2.0

Sonos upgraded the software for its digital music system and rendered one of our favorite music-streaming products even better. The most significant change is that Rhapsody subscribers can now sign into their accounts, browse, and stream music without ever needing to power up their PCs.

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Games for Windows

Microsoft game studios

ENSEMBLE STUDIOS

TEEN T Blood Violence

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As old TVs find their way into the dustbin of history, the analog radio frequencies they used will be reborn as wireless networking services.

Freeing Up the Airwaves

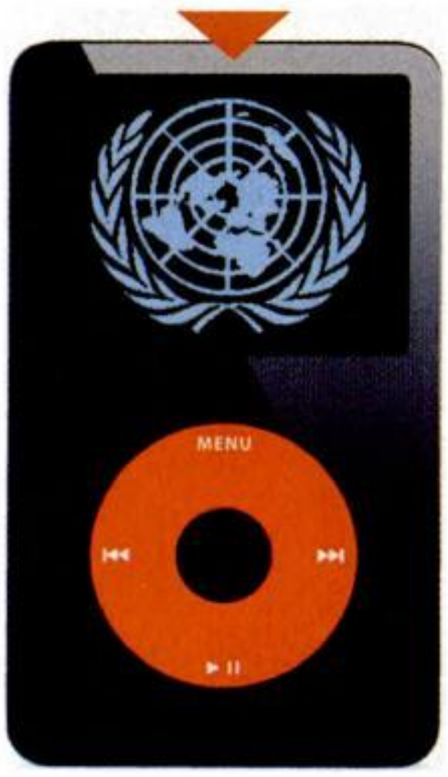
With available radio spectrum now a scarcity on American airwaves, it's getting harder for tech companies to find frequencies for new products. But thanks to the impending demise of analog TV broadcasts, there will be large chunks of unlicensed spectrum available in 2008.

The FCC's latest redeployment timetable says the agency will start accepting applications for device certification in 2007, with the intention of seeing retail products on store shelves by February 2009.

UN to Podcasters: Shut Up!

New international broadcast treaty could kill podcasts

A new broadcast treaty being pursued by the United Nations World Intellectual Property Rights Association could put a nail in podcasting's coffin, and bury your existing rights along with it. The treaty expands the existing international broadcast treaty, which hitherto covered only traditional media, to include the web. It would extend DRM restrictions to everything from podcasts and YouTube videos to blog posts. By making it illegal for podcasters and other content creators to aggregate and mirror content online, whether it's copyrighted or not, the new treaty could spell certain doom for podcasting as we know it.



Don't get too attached to your podcast content. The UN is giving your rights away.

Who Said Storage is Boring?

There may be a dearth of HD-DVD burners available, but Toshiba is betting that its improved DVD/HD-DVD disc—which works without flipping—will give Blu-ray another jab in the eyeball. The upgraded DVD TWIN format allows for up to three layers on a single optical disc—an improvement over the original two-layer design. The three layers can be split any way the studio wants: two 4GB layers for DVD and one 15GB layer for HD-DVD, or 4.7GB DVD with 30GB of HD-DVD content. The DVD TWIN format is different from Warner Brother's proprietary combo discs, which feature DVD on one side and HD-DVD on the other.

The thumb drive market could also get a little more complicated with the release of *Ceedo 2.0* software ($30, www.ceedo.com). *Ceedo* offers much of the functionality of SanDisk's popular U3 interface, but unlike *U3* support, which must be built into the drive, *Ceedo* can be added to any drive. SanDisk and subsidiary M-Systems co-developed *U3* and are unlikely to offer *Ceedo* on their drives, but competitor Lexar offers a *Ceedo* model. Looming standards war? Hardly. Verbatim already offers both *U3* and *Ceedo* drives, and the USB Flash Drive Alliance has tacitly endorsed both.

Flash drives could look different in 2008 when Samsung introduces its phase-change RAM. PRAM, as its known, promises the speed of RAM along with the nonvolatile properties of flash RAM. The company claims initial speeds will be about 30 times faster than flash and that the drives will have a longer lifespan.

FUNSIZENEWS

CHIPS WITH FRICKIN' LASER BEAMS?

No, it's not what you think. But it just might be cooler. Intel's new Indium Phosphide hybrid chips use light to transmit data between chips, allowing bandwidth some 50 times greater than with silicon alone. While it'll be years before you get laser-based chips on your desktop, Intel's currently working to make chips with data rates up to 160GB/s. Mount those puppies on a shark's head, and you've got the ultimate weapon.

HP LISTENS IN ON PRESS

It seems unlikely that recently deposed HP chairwoman Patricia Dunn had her customers' best interests in mind when she gave the order to spy on members of the press by way of tracking their phone records. We're not sure if they pulled our records, but it wouldn't have done them much good since the only number on our speed dial is 1-900-FURRIES.

ANOTHER MISSED CONNECTION

We probably don't have to tell you about the pitfalls of Internet dating, but if you ever needed an example, Craigslist prankster Jason Fortuny has created the perfect illustration. Simply by posting a fake ad on Craigslist Seattle, using text and a photo pasted from another part of the site, Fortuny raked in a whopping 178 responses in 24 hours—including nearly 150 pictures of various men in their birthday suits. Then he published the whole ball of wax on Encyclopedia Dramatica—uncensored and unedited, emails and all. Ew.

SECOND LIFE BREAK-IN

Most people we know barely have their first lives under control without having to worry about the security of their *Second Life* persona. A break-in at the alternative online universe has put thousands of user accounts at risk, exposing usernames and passwords and even payment information. And while the lives of *Second Life* characters aren't real, it's hard to ignore the massive amount of genuine currency (nearly half a million bucks per day at press time) running through the site's virtual economy.

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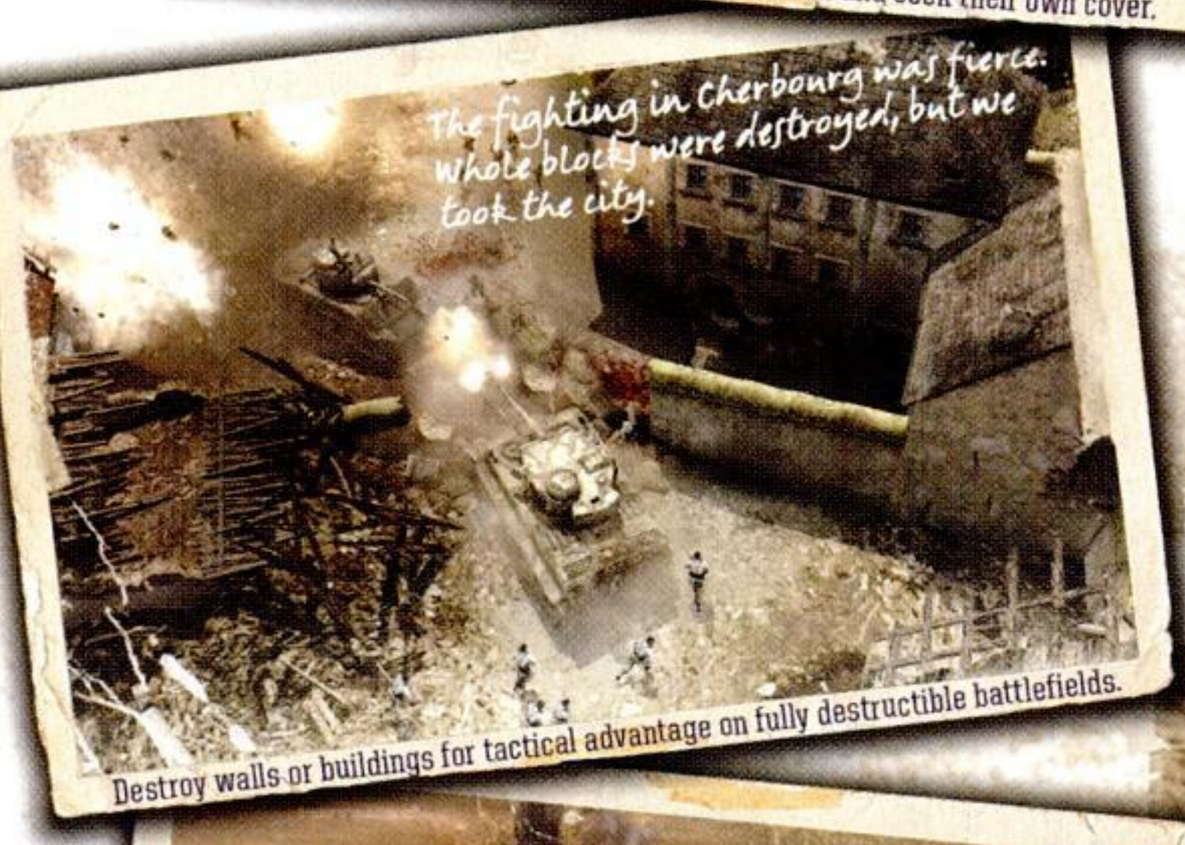

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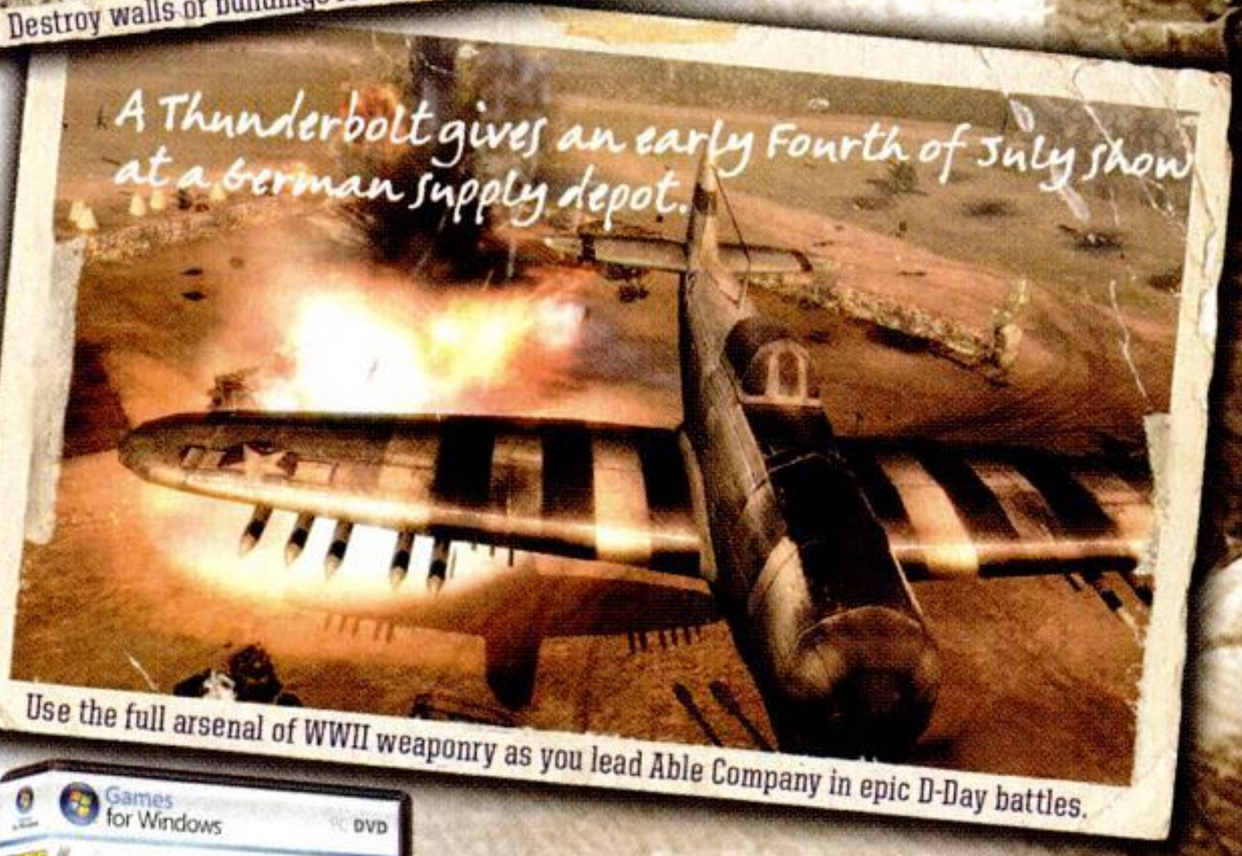

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MIDRANGE CPUs

Intel Core Duo **vs.** AMD Athlon 64 X2

Maximum PC loves covering high-end CPUs—it's always Extreme this or FX that. But to the average Joe or Jane, dropping $1,000 on a CPU is plain nuts. What about CPUs that the masses can afford? Well, we hear you loud and clear, so we've devised a CPU shootout that'll keep your wallet fat and your accountant happy.

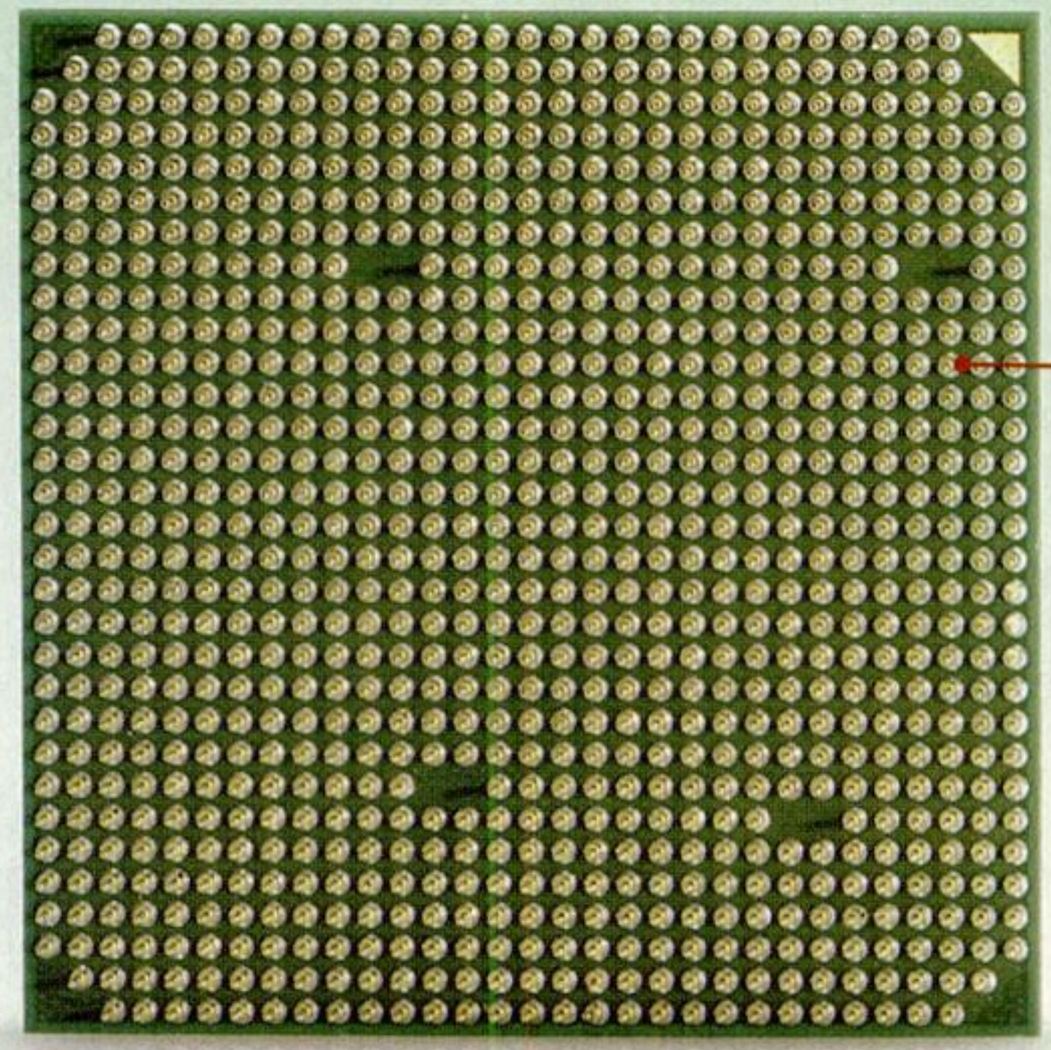
Here, we pit Intel's hot new Core 2 Duo E6600 against AMD's stupendous Athlon 64 X2 5000+. Both are dual-core procs and both are priced at about 300 bones. We cleared off a bench in our Lab and paired the two CPUs with the most popular chipset for their respective platforms (975X for the Intel and Nvidia's nForce 590 for the AMD). Then we equipped them with the same hard drive, graphics card, and RAM before we updated both boards with the latest drivers and BIOS available. Finally, we reached for benchmarks that would pound the CPU to determine which is the best cheap chip.

BY GORDON **MAH UNG**

round 1 **AVAILABILITY**

Initial complaints about Intel's Core 2 being difficult to find seem to have been resolved. We took a swing through a local large retailer and found Intel's entire lineup available. Surprisingly, it was AMD's AM2 parts that were in short supply. And a check of Pricewatch.com showed only two vendors with the 5000+ available, but 10 vendors pushing Intel's E6600. It came as a surprise to us, but it's pretty clear there's a shortage of 5000+ parts right now. Perhaps it's Dell sucking up all the inventory.

WINNER: CORE 2 DUO



AMD ATHLON 64 X2 5000+, $300, www.amd.com

round 2 **PRICING**

We know we said both processors are $300 midrange chips. And they are, mostly. The wholesale price of the Core 2 Duo E6600 is $315 while the Athlon 64 X2 5000+ is listed at $300 (when both processors are purchased in quantities of 1,000). However, those prices don't seem to be reflected in street pricing. Normally, CPUs sell below their 1K unit price, but we found the E6600 costing from $330 to $370 at fairly legitimate online stores. Not great, but not horrible like it is on the AMD side. At online stores, we found the 5000+ chip starting at $370 and hitting a ridiculous $600. Huh? *Exsqueeze* me? The price of the chip was so high, we thought about using an Athlon 64 X2 4600+ instead.

WINNER: CORE 2 DUO

round 3 **MOTHERBOARD AND CHIPSET SUPPORT**

What good is the CPU if it has no pony to ride? The world seems to be awash in Core 2 Duo boards today, but they're all based on Intel's P965 or 975X chipsets. They're respectable boards, but they just won't cut it if you're looking to buy a pair of graphics cards with the money you save on the CPU. It's worse on the Nvidia side, which mysteriously hasn't been able to ship its nForce 590 Intel Edition chipsets to the masses. For the AM2, you can get just about any flavor chipset you want, so AMD nabs this category.

WINNER: ATHLON 64 X2

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round 4 FEATURES

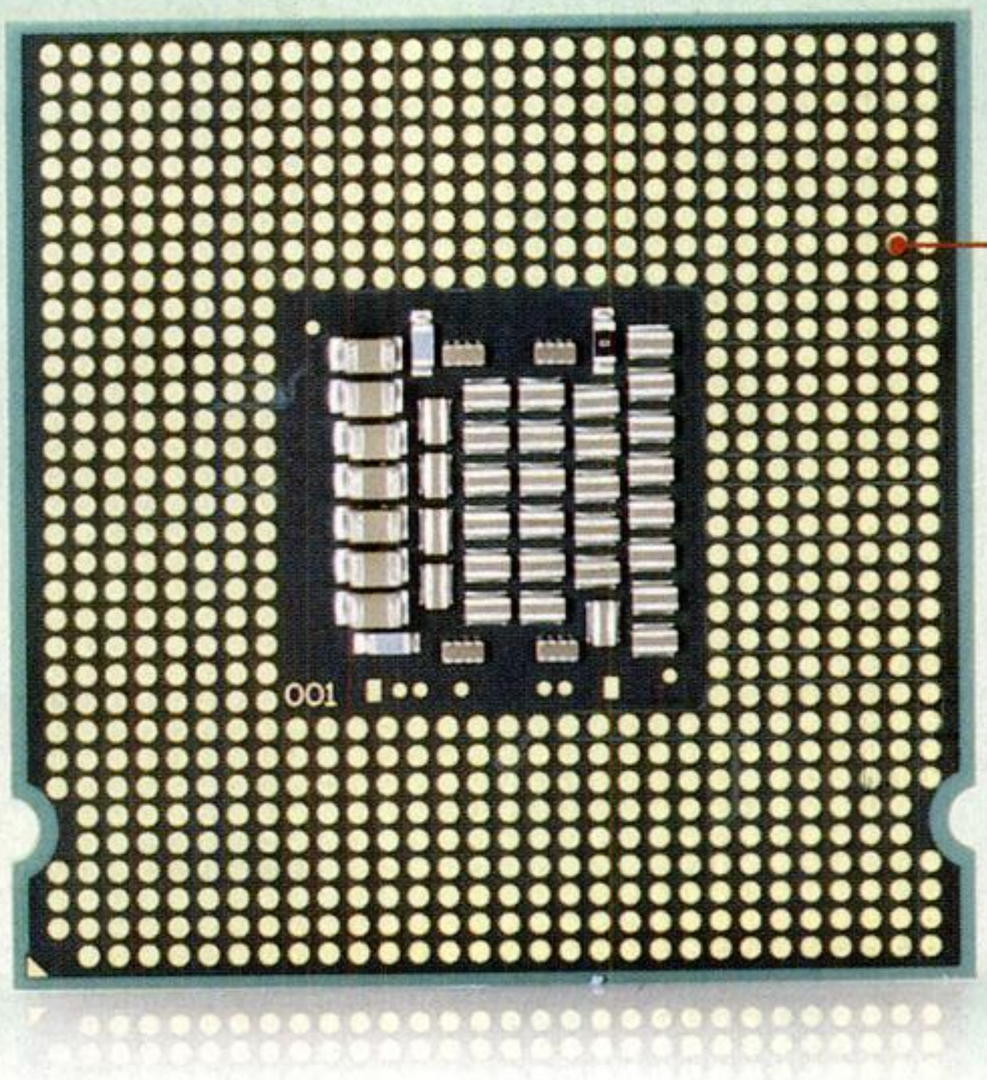
Let's compare these two processors to their Fifth Avenue siblings: the FX-62 and X6800. AMD drops the clock only 200MHz (about a 7 percent reduction) to make the 5000+. But AMD also cuts the L2 cache of each core to 512KB—half that of the FX-62. The E6600 is also two notches down from the top and gimped two ways: It's multiplier-locked, to prohibit easy overclocking, and Intel chopped a whopping 533MHz (18 percent!) off the chip's clock speed. Fortunately, the entire 4MB of shared L2 cache is intact. We call this the "crippled" category; but really, considering how much power you get for 70 percent less cash, the winner is obvious.

WINNER: EVERY TIGHTWAD IN TOWN

BENCHMARKS

	2.4GHZ CORE 2 E6600	2.6GHZ ATHLON 64 X2 5000+	PERFORMANCE DELTA
CACHE	4MB / 4MB (shared)	1MB / 512KB	
BIBBLE 4.81A RAW CONVERSION (SEC)	**597**	911	52.6%
PREMIERE PRO 2.0 HDV TEST (SEC)	**2,251**	2,850	26.6%
PHOTOSHOP CS2 (SEC)	**255**	297	16.57%
PC MARK 2005 OVERALL	**6,892**	6,573	4.8%
PC MARK 2005 CPU SCORE	**5,727**	5,346	7.1%
SCIENCEMARK 2.0 SCORE	1,363.30	**1,452.73**	-6.1%
QUAKE 4 LOW QUALITY 640X480 (FPS)	**152.4**	146.2	4.2%
3DMARK06 CPU SCORE	**2,052**	1,952	5.1%
3DMARK05 CPU SCORE	**8,918**	7,657	16.57%

Best scores are bolded. We tested the Core 2 Duo on an Intel D975XBX motherboard and the Athlon 64 X2 on an Asus M2N32-SLI board. We used 2GB of DDR2/800 RAM, a WD4000KD drive, an eVGA GeForce 7900 GTX, Corsair DDR2/800 RAM, a PCPC1KW PSU, and the same drivers where applicable for all tests.



INTEL CORE 2 DUO E6600, $315, www.intel.com

round 5 PERFORMANCE

We all know that performance is what really matters. Intel's top-gun Core 2 Extreme X6800 outclocks AMD's fastest—the 2.8GHz Athlon 64 FX-62—by about 133MHz, and the X6800 outperforms the latter by 20 to 50 percent in the benchmarks. But can the Core 2 work its magic with a 200MHz disadvantage? Turns out, yes. The Core 2 Duo E6600 outruns the Athlon 64 X2 5000+ in just about every category: From gaming to image editing to video encoding and editing, the Core 2 Duo E6600 was the clear winner. We could find only one benchmark that the E6600 lost: *ScienceMark 2.0,* which Intel has long accused of being "pro-AMD." We saw the Core 2's greatest advantage in applications; the delta in our gaming benchmarks was closer, with the 5000+ earning scores 5-to-16 percent slower than the Intel chip.

WINNER: CORE 2 DUO

And the Winner Is...

With pricing, availability, and performance all going to the Core 2 Duo, it's a slam dunk win for Intel. It's pretty clear that it's going to take an updated core for AMD to be competitive. MPC

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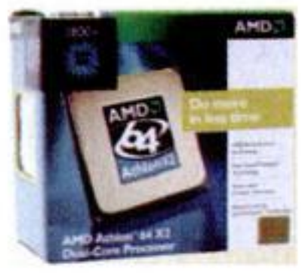

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Our consumer advocate investigates...

Viggo, watchdog of the month

✓Popcorn.net's Pop-Ups ✓Grisoft's Warning ✓Apple's Burning-Hot Batteries

TRIAL OVER? PAY UP OR ELSE...

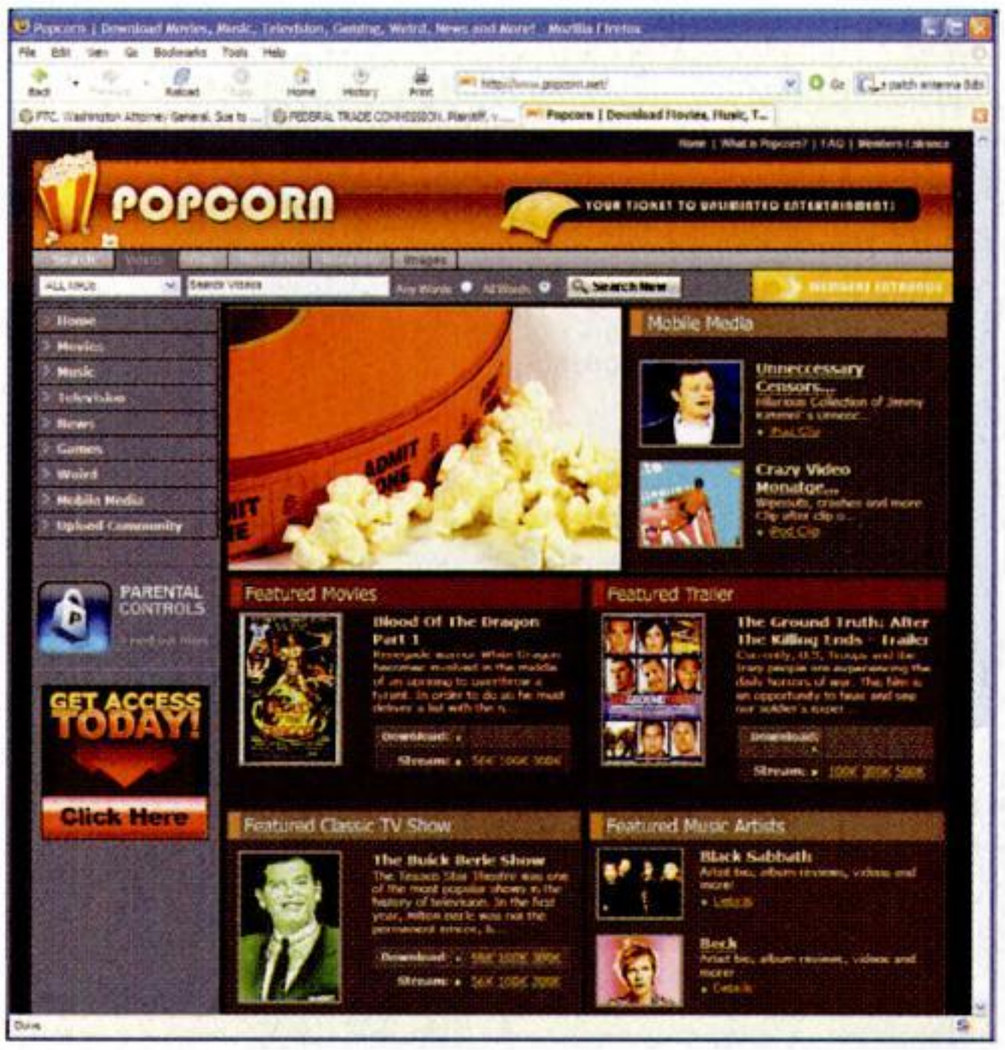
I'm not sure how many unsuspecting people have run into this "wonderful" software, but I did while trying to stop annoying adware problems on my friend's PC. He would randomly get a pop-up stating: "Your free trial of Popcorn.net is over, click here to purchase." So, in an attempt to help out, the first thing I did was go to Add/Remove Programs in the Control Panel, and lo and behold, I couldn't remove the app.

I did a little research on this program, which supposedly lets you watch movies online, and here's where it gets interesting: I found that the EULA says you consent to the program updating itself automatically and that the company may demand money from you to remove the app because you consented to it being installed. Furthermore, the program says you pretty much have to pay the company if you don't cancel the "trial subscription" within the time period it sets. You can find info about how to remove the program from this website: ***www.schrockinnovations.com/removepopcorn.php.*** *Is this even legal?*

— Keith Gajeski

You've run into a new flavor of malware that's been labeled "extortionware," or "strong-arm ware." In the case of Popcorn.net, aka Movieland.com, the company claims that the app is installed only after you've read a long EULA and clicked OK to install it, but there are numerous allegations on the Internet that the app is installed via surreptitious drive-by web-browsing methods. Whichever way it gets installed, the outcome is the same when the trial period expires: pop-ups galore that demand you pay $29.95 to remove them. Illegal? No way, the company claims; you agreed to a contract when you installed the software. When consumers contacted Movieland.com to complain, they were told: "It is impossible for this software to exist on your system without a user actively following a four-step installation process."

But what if someone else installed it on your machine?



Popcorn.net and its apparent owners, are being sued by state and federal regulators for annoying and allegedly illegal pop-ups.

The company says: "We understand that multiple users may access a single computer. However, the machine's owner is solely responsible for regulating access to the computer. As such, it's your responsibility to satisfy the contract entered into by way of your machine and your IP address. Failure to satisfy your payment obligation may result in an escalation of collection proceedings that could have an adverse effect on your credit status."

Employing methods akin to a Sony rootkit or malware, the application makes it nearly impossible for users to uninstall it, and most users were unable to prevent the app from generating full-screen pop-ups. "Customer support" refers consumers to a 900 number that charges $34.95 an hour. And even folks who fix the pop-up problem might still have the software resident on their machine. It all sounds pretty fishy to the Dog. And to the authorities too, apparently.

The Federal Trade Commission and the Washington state Attorney General have sued Popcorn.net, Movieland.com, Digital Enterprises, and a dozen other names the company operates under for allegedly violating the FTC Act, which governs trade practices.

The FTC's suit says many consumers did not consent to having the pop-ups and that a PC's owner is not obligated to pay any contracts that other people entered into while on the computer. The FTC suit also names Easton Herd and Andrew M. Garroni of Los Angeles in the suit. The Dog was unable to reach Herd, Garroni, or Popcorn.net for comments.

The state of Washington is also taking action against Herd, Garroni, and Popcorn.net for allegedly violating the state's Computer Spyware Act, which prohibits hijacking a person's computer, changing security settings, and preventing users from removing spyware. The state said both Herd and Garroni could be fined $100,000 per violation of state law and $2,000 under the Consumer Protection Act.

Movieland.com and Popcorn.net might also be the target of a class-action suit that alleges the company is violating California's consumer protection laws. The firm of Manuel H. Miller said it plans to sue Popcorn.net to recoup consumers' losses.

"[The Popcorn.net software] is really one of the nastiest things I've ever seen," said Jeff Schwartz, a spokesman for the firm, who said his own father was a victim. Schwartz said readers who want more information on the planned suit can visit www.manuelhmiller.com for more information.

ARE THE POP-UPS FREE TOO?

AVG Free Edition *is one of the greatest things you've ever included on the* ***Maximum PC*** *disc. I've had it installed on my notebook PC for quite some time and my wife licensed a copy for her laptop. We have a file server running Windows Sever 2003 that does not have* ***AVG*** *on it but that our notebooks connect*

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic the Dog on them by writing **watchdog@maximumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

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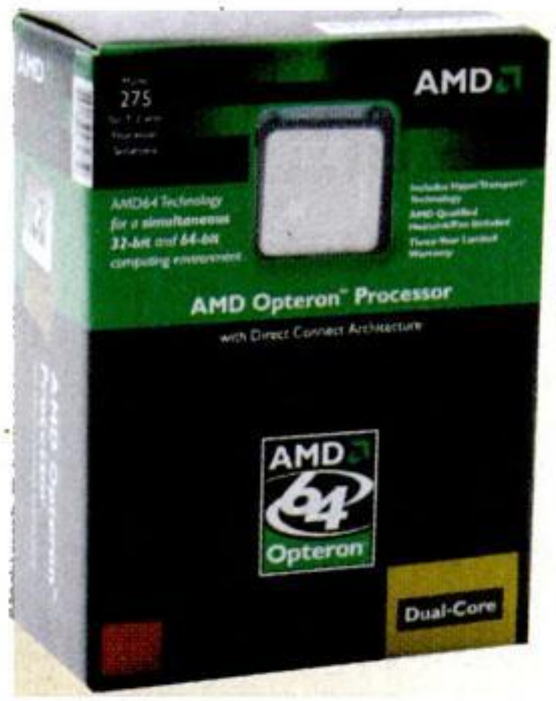

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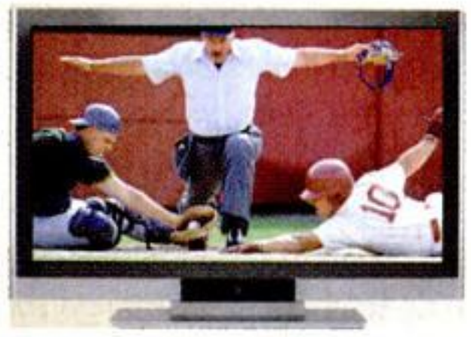

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*to as part of its Active Directory Tree. Things have been working fine, but in the past couple of months suddenly every time **AVG** updates it pops up a window that states I may be in violation of the license agreement. I can clear the pop-up and continue, but it's getting to be a regular annoyance. Yes, I could pop for the network version (apparently, that's the problem—the app has detected that I'm on a network and that the single-machine license might not be appropriate), but I really don't need it. As a non-commercial user, I can't contact tech support to see how to stop this annoying ad. It's beginning to feel like they're spamming me, as a free-version user, in order to get me to buy a commercial version. If that's the case, I can't blame them, but why not just say so rather than bug me about a nonexistent license violation?*

—Patrick Kelley

The Dog pinged a Grisoft spokeswoman who said: "Grisoft did run a campaign to inform users who have the free version installed in a 'network' that they may be in violation of the license agreement. They did receive feedback from users who actually have networks at home as non-commercial, so they have stopped the campaign. The user doesn't need to buy the network edition if he is non-commercial, which sounds like he is.

"The user was most likely receiving the pop-ups due to his environment which included a Microsoft Windows domain. Generally, home users do not have such a sophisticated setup, so it appeared to be a commercial environment instead. The campaign was not targeted at users with *AVG Free Edition* in any network but was limited to users with Microsoft Windows Domain installed. The campaign only ran for about two to three weeks."

The spokeswoman said by the time you read this, the pop-ups should be gone. Woof. MPC

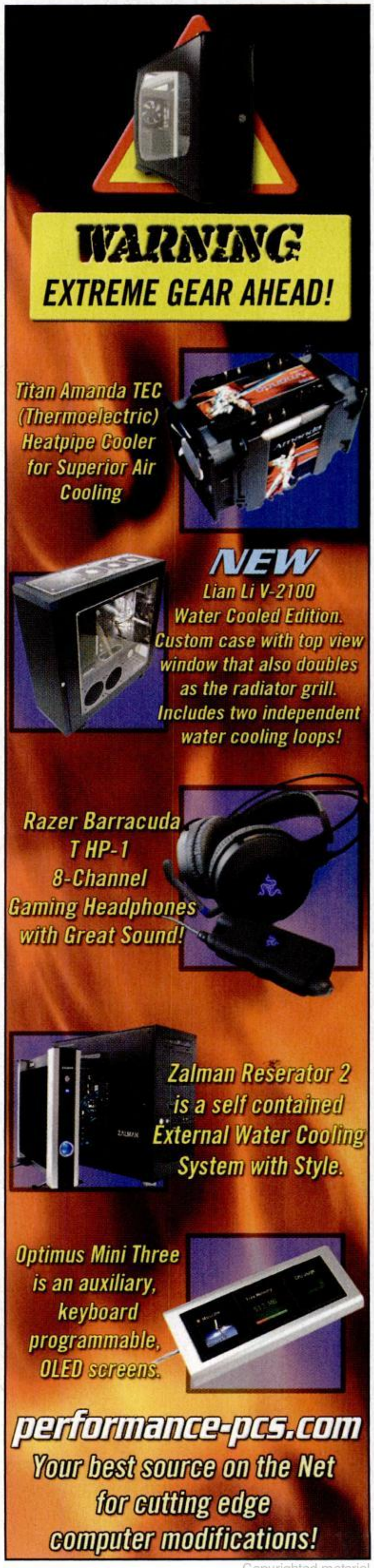
Recall **Alert**

When it burns, it's blazing. On the heels of Dell's massive battery recall affecting 4.1 million notebook PCs, Apple has recalled 1.8 million notebook batteries that could overheat and pose a fire hazard. Apple said nine people have reported overheating batteries, with two of those incidents resulting in minor burns. The bad batteries were manufactured by Sony in Japan, Taiwan, and China (Sony cells are also at the root of Dell's latest recall) and were sold between October 2003 and August 2006 in the following notebook models: 12-inch iBook G4, 12-inch PowerBook G4, and 15-inch PowerBook G4. This recall does not affect the new Intel-based MacBook Pro notebook computers, although those machines were subject to a voluntary recall of batteries that didn't pose a fire hazard (see the Dog's November column for more information on that recall). To see if your battery is part of the recall, you must remove the battery from the notebook and check the battery model number and battery serial number range. You can also contact Apple by phone at 800-275-2273, between 8 a.m. and 8 p.m. Central time, Monday through Sunday. You can also visit **http://support.apple.com/batteryprogram** to check your battery or obtain more information. If your notebook battery is affected, Apple recommends that you immediately stop using the battery in question—although you may operate the notebook on the AC adapter—and contact the company for a free replacement.

Apple is recalling 1.8 million batteries used in its PowerPC-based notebooks, because they could overheat and catch on fire.

RECALLED APPLE BATTERIES

	BATTERY MODEL	BATTERY SERIAL NUMBER RANGE
12-INCH IBOOK G4	A1061	ZZ338 - ZZ427, 3K429 - 3K611, 6C519 - 6C552, ending with S9WA, S9WC or S9WD
12-INCH POWERBOOK G4	A1079	ZZ411 - ZZ427, 3K428 - 3K611
15-INCH POWERBOOK G4	A1078 and A1148	3K425 - 3K601, 6N530 - 6N551, ending with THTA, THTB, or THTC, 6N601, ending with THTC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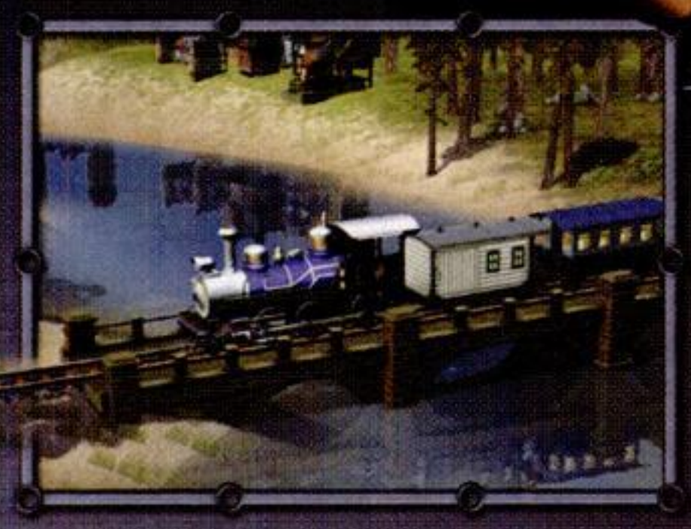

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Preview!

Next generation nothin', Maximum PC shows you the next, next generation of hardcore computing!

BY MAXIMUM PC STAFF

AGP, DDR, and Socket 939 are just a few of the casualties left in the wake of technology's forward march. But at Maximum PC we waste no time mourning the loss of hardware whose time has passed; instead, we look to the glorious future that awaits us—and a glorious future it is!

If even a fraction of our predictions over the following pages comes to pass, 2007 will be a banner year for technophiles. Even if Vista turns out to be a dog (thankfully, the current signs are actually quite positive), we've still got a veritable cornucopia of hot new technologies coming down the pike in the next year. Join us, as we say, "See ya later, AGP!" and embrace the next, next generation.

ILLUSTRATION BY OLIVER WOLFSON

INSIDE:

Windows Vista

Quad-Core CPUs

Wireless USB

802.11n

WiMax

1 TB Hard Drives

Blu-ray

HD-DVD

PCI Express 2.0

DDR3 Memory

DirectX 10 Videocards

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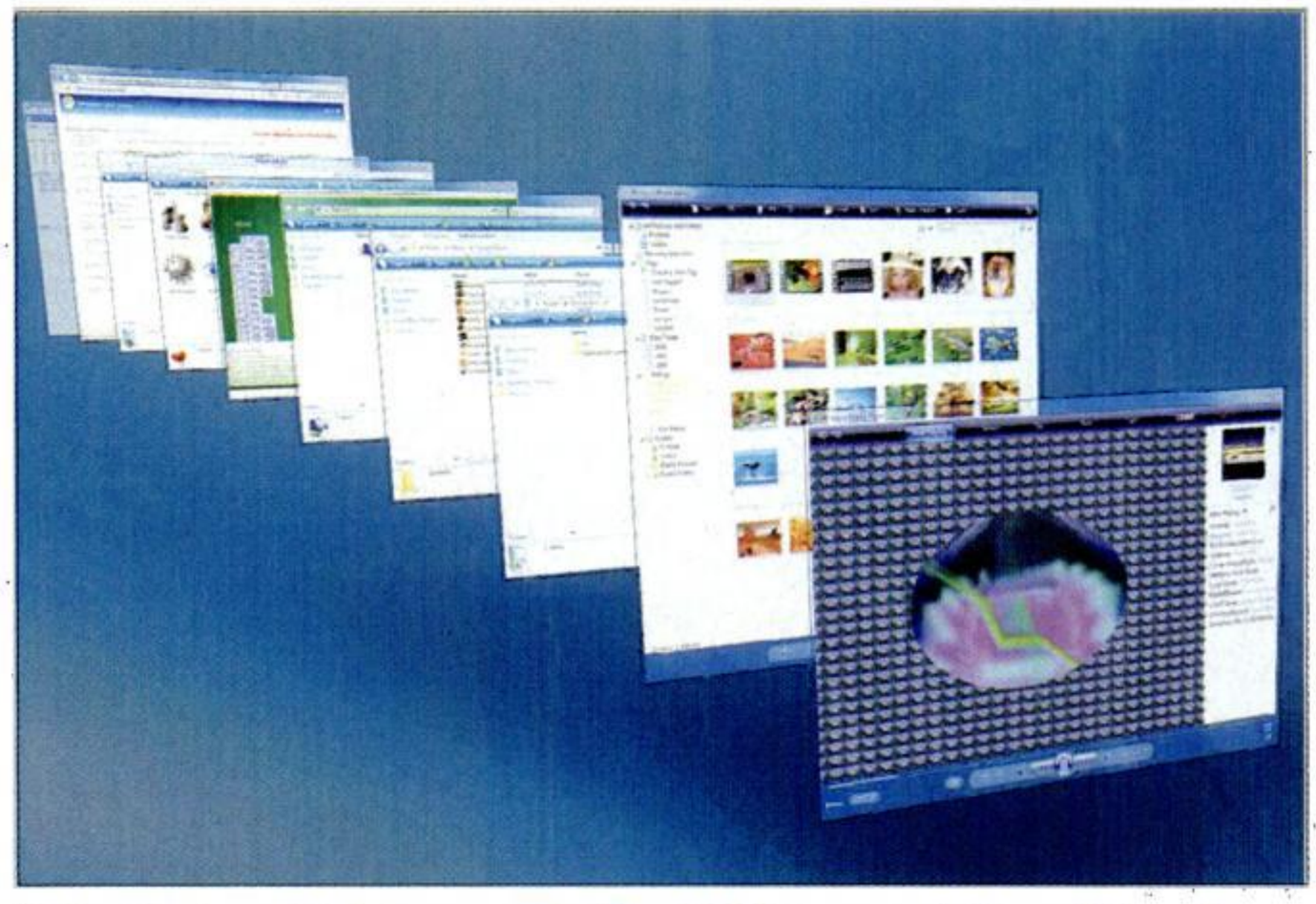
Windows Vista

After epic delays, Microsoft's next OS will finally ship in 2007

For the last few years, Microsoft has been toiling ceaselessly on a little project called Windows Vista. Along the way, the company has made some bold promises about the long-awaited successor to Windows XP, some of which were actually kept. And even though the commercial release won't quite live up to Microsoft's original vision of pure 64-bit majesty, there can be little doubt that Windows Vista will change the way you work and play. At press time, Microsoft had just finished stamping Release Candidate 1 to DVD, and we put it to the test. While the final product is sure to see its share of changes from what we have here, it's now possible to get a clear view of what the final product will look like. Here's what the next version of Windows has in store.



Hitting Windows-Tab brings up Flip 3D, which lets you quickly surf through your open windows to find the one you're looking for.

A NEW LOOK

Microsoft didn't exactly throw out the baby with the bathwater when it started developing Windows Vista, but it came pretty close. Rather than simply add new features to the same old pile of legacy code we've all been using for years, the Redmond gang got back to basics and developed this OS from the ground up. And while you're not likely to get lost looking for your favorite programs in the new interface, the code underlying it all is vastly different than in Windows XP—making for a faster, smarter computing experience.

The first difference you're bound to spot in Windows Vista is a new look, called Aero, thanks to a totally revamped graphics engine that drives everything you see onscreen. Dubbed Desktop Window Manager, the new engine renders graphics as 3D surfaces in off-screen video memory, which it then draws onscreen, instead of the old-fashioned 2D pixel maps that previous versions of Windows used.

By leveraging your 3D hardware, Aero has the power to render every single window on your desktop as a separate object that can be scaled, moved, and warped without any loss of quality. When you pop open your Pictures folder to rifle through your images, you can stretch, shrink, and move the window as much as you want without having to stop and wait for the whole thing to redraw on your screen. The dynamic window redraws really benefit movie playback—instead of the tearing you see when you move a video window in XP, the contents continue playing in Vista no matter what you do. Aero also enables window transparency, so you can sneak a peek through windows to see what's behind them. It's a cool-looking effect, but in reality it only reveals distorted outlines of the underlying windows, so it's not particularly useful.

Aero sports a few enhancements that make finding your way around a little easier. Detailed thumbnails pop up when you hover over open apps in the Taskbar. Or you can pull up Flip, the improved Alt-Tab switcher, or the cool 3D switcher called Flip 3D, to display your open windows as separate objects that you can navigate among. This makes finding the window you're looking for a little bit easier on a busy, app-cluttered desktop. So even if you're a disorganized oaf, you can work with Oompa Loompa-like efficiency (minus the puffy pants and impromptu song-and-dance numbers).

PUTTING THE HORSEPOWER TO WORK

Vista's snazzy new appearance is just the start of the Windows-wide overhaul. The devil is, as they say, in the details. And Vista is devilishly detailed. Just about everywhere you look, Vista gives you more information about *everything* your computer is doing than XP ever did. Hover over an application on the Taskbar and you'll see a live thumbnail of the app's window. Pop open the Documents folder and you see thumbnails of your files. Click a file and Vista gives you copious information about its contents, including the original author, date of creation, and other basic metadata. There are also system-wide user-assigned ratings and additional comments from

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We all know little Timmy has problems staying focused. Limit his game time and keep him off the adult sites with Vista's Parental Controls panel.

the document's creator, as well as a live preview of the content. Open the Pictures folder, and you'll see not only a thumbnail of each pic, but also a variety of useful options for handling the files, from previewing them in Windows Photo Gallery to generating a slide show or burning all the images to a disc.

At the heart of Vista's detail-oriented operation is a new search engine that constantly indexes everything on your PC, searching through the contents of every file and message to give you an up-to-the-second look at your entire digital universe. And while search tools ain't exactly sexy, we're duly impressed with the speed of Vista's file finder—and the ability to find the file you're looking for instantly, no matter where you left it last, is simply a necessity.

ADMIN OVERHAUL

It's not exactly breaking news that Windows XP has its share of security flaws, and we're sure that when Vista hits the shelves it'll immediately fall prey to a host of innovative new security threats, too. This is to be expected, and grown-ups understand that life can sometimes be that way. But Vista's radically revamped permissions scheme should go a long way toward preventing one user's spyware encounter from overtaking the entire machine. To keep malware threats under control, Vista has adopted a Unix-ish permissions system that requires you to grant permission to any app that tries to write to protected folders (such as Program Files), execute administrative operations (such as installing new apps), or access the Internet unexpectedly. This should prevent viruses, worms, and other bad things from surreptitiously overtaking your hard drive; and even if you are infected, the infestation will likely be limited to your profile, rather than your entire hard drive.

Along with stricter permissions, Vista includes a host of new parental controls that let you restrict web surfing and downloading, limit access to games by rating or content, block specific apps that you just don't want your kids messing with, enforce time limits, and print out detailed activity reports. So you can be a parent and Big Brother all at once. Yay!

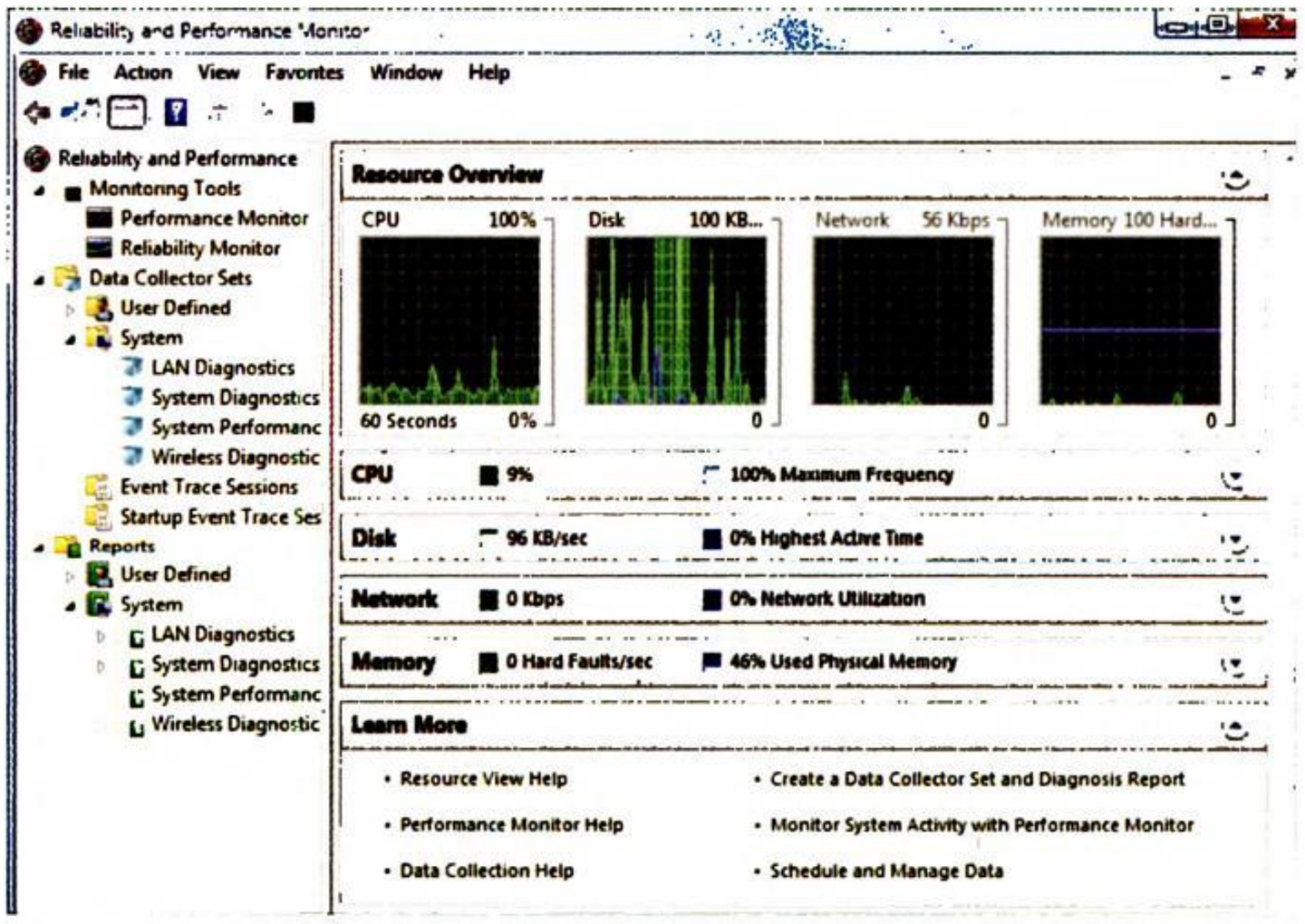
PEAK PERFORMANCE

All the cosmetic upgrades in the world are useless if the OS itself lags. Fortunately, Microsoft didn't leave performance out of the equation. Where Windows XP could generally be counted on to slow to a crawl after a few months of use, Vista promises to keep performance up and system lag down.

No, there's no magician inside to keep everything running fast automatically, and you'll still have to do a little problem solving to get (and keep) your system running at top speed. But Vista's built-in tools will make that job a hell of a lot easier than it's ever been before by constantly monitoring the performance of all the hardware and software in your PC, and tracking its performance over time. If a particular hardware component or software update is causing a severe bottleneck, you'll get a little prompt from Windows to take some sort of action. For instance, when we performed an upgrade from Windows XP on one well-used notebook, Vista spotted a startup file slowing down the boot process and quickly let us know about it. We then popped open Performance and Information Tools from the Control Panel and clicked "Manage startup programs" to track down the offending app (in this case, some crap shareware we never used anyway), so we could neutralize it.

COOL TOOLS

Just like XP, Vista comes preloaded with a bunch of apps. Unlike XP, however, Vista's tools are actually useful enough that you can literally use the OS out of the box.



The Reliability and Performance Monitor gives you all your system's vital stats at a glance.

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WINDOWS MAIL

Apart from the incessant barrage of security threats it engendered from the online world, we didn't have much of a problem with *Outlook Express.* It did the job. But *Windows Mail* does the job a whole lot more competently, and with a little more panache. Chief among the new features are halfway-intelligent junk-mail filtering and smooth integration with *Calendar* and *Contacts*.

At last, *Microsoft Outlook Express* gets a makeover—including a new name. *Windows Mail* is a more robust email solution including smarter spam control and integration with *Windows Calendar*.

WINDOWS CALENDAR

The introduction of *Windows Calendar,* coupled with *Windows Mail,* raises serious questions about the need for the full-blown *Microsoft Outlook. Calendar's* lean resource footprint and simple interface make it super-cinchy to fill up your dance card and keep everything on track without having to muck around in *Outlook's* kludgy menus. Because *Calendar* supports the open iCalendar format, you can easily publish your calendar to the web or share it with others to let the world know what you're up to.

WINDOWS MEETING SPACE

Have you ever needed to share a file with someone sitting next to you? It's tough to do if you don't have access to the same wireless networks, isn't it? Using Windows Meeting Space you can create a shared, peer-to-peer work session that your colleagues can access. You can even share your actual desktop, allowing others to control your machine and installed apps remotely if needed. We're waiting to see how this pans out in real life, because we still like collaborating the old-fashioned way: by hollering over our cubicle walls.

WINDOWS SIDEBAR

Widgets are nothing new, but Microsoft finally made an honest woman out of them by marrying them to its operating system. While the widgets (Microsoft calls them "gadgets") like to hang out in the Sidebar by default, you can detach them and stick them anywhere on your desktop.

Microsoft finally got down with widgets, building support for various little applets in its Windows Sidebar. But you're not restricted to this little area: You can also embed them in the desktop.

PRICING PANIC

While it's still early to render a final judgment on Windows Vista, we're generally satisfied with what we've seen of the OS so far. It improves on the XP experience with better graphics, more efficient app management, and slicker tools without increasing hardware demands too severely. It does, however, put a much greater toll on your pocket book. Microsoft has announced a whopping $400 price tag for its Vista Ultimate edition, while even the cheapie Home Basic edition brings up the bottom with a sticker price of $200. Ouch. (See our chart below to find out what each version costs and offers.)

While it's impossible to rule out further delays, at press time the current release date for Windows Vista remains January 30, 2007.

VISTA VERSIONS

VERSION	FEATURES	PRICE
WINDOWS VISTA HOME BASIC	Minimal features, but for home users. Good for basic web, email, and general computing needs such as homework. Doesn't include the Aero interface.	$200 / $100 upgrade
WINDOWS VISTA HOME PREMIUM	Entertainment-centric features such as Media Center and DVD burning included, as well as support for Tablet PCs. Aero included.	$240 / $160 upgrade
WINDOWS VISTA BUSINESS	Focused on small- and medium-size businesses, Vista Business lacks such frills as Media Center, but includes volume-management tools to help control the massive amounts of spreadsheets, databases, and other BS that business users generate.	$300 / $200 upgrade
WINDOWS VISTA ENTERPRISE	Available only to massive, evil corporate entities, Vista Enterprise packs cool features for big networks, such as BitLocker Drive Encryption, which will hopefully keep corporate monkeys from exposing your private data every time their laptops get swiped off a table at Starbucks. It will also support robust Unix-based apps through Virtual PC Express.	Volume pricing only
WINDOWS VISTA ULTIMATE	Want every feature from Home Premium and Enterprise? Get Ultimate.	$400 / $260 upgrade

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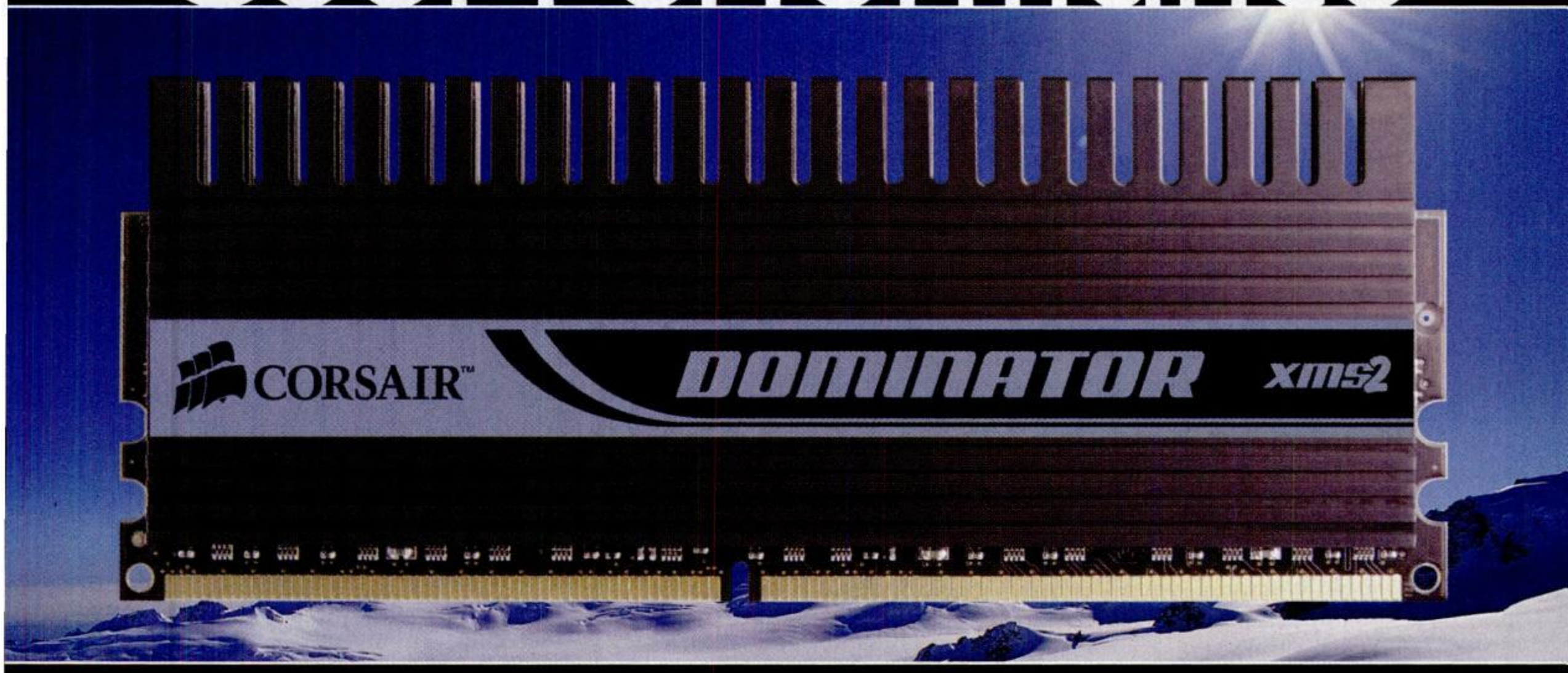
EPP Enhanced Performance Profiles

Cool Performance



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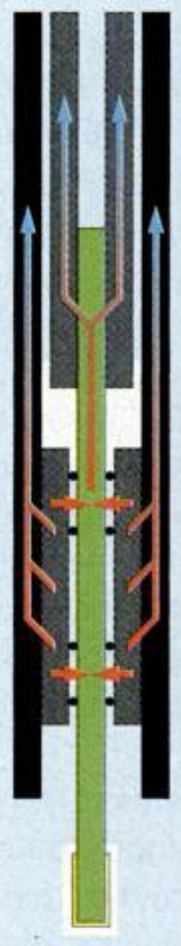
Here's the latest in Corsair's ten year heritage of innovation in performance memory: we've redefined memory heat sink technology. And the result is unprecedented performance and reliability. When we ran a preview module through system benchmarks at COMPUTEX, an overclocked DHX module with our optional airflow fan was able to hit a heart-stopping 1250MHz (PC-10,000) while maintaining cool, reliable performance.

Protect Components While You Push Performance

Pushing performance specs generates heat, and that can compromise reliability and component life. The advanced cooling ability of DHX heat sinks keeps your memory safe and reliable even as you push it to the limit. Under the name XMS2 Dominator, this DHX technology will be showing up on both Corsair parts designed for extreme overclocking and on memory designed for performance computing and gaming.

Also Featuring Enhanced Performance Profiles (EPP)

As with all new Corsair performance memory, XMS2 Dominator modules feature EPP, the new open standard for the Serial Presence Detect (SPD) jointly developed by NVIDIA and Corsair. EPP simplifies overclocking for beginners and provides unparalleled control for experts.



AIRFLOW

An optional fan (not shown) provides even more cooling and protection.

DHX DUAL-PATH HEAT XCHANGE

Corsair's proprietary DHX technology dissipates heat two ways: it draws heat away from the module through the RAMs and provides an additional path for heat transfer within the module through the ground plane!

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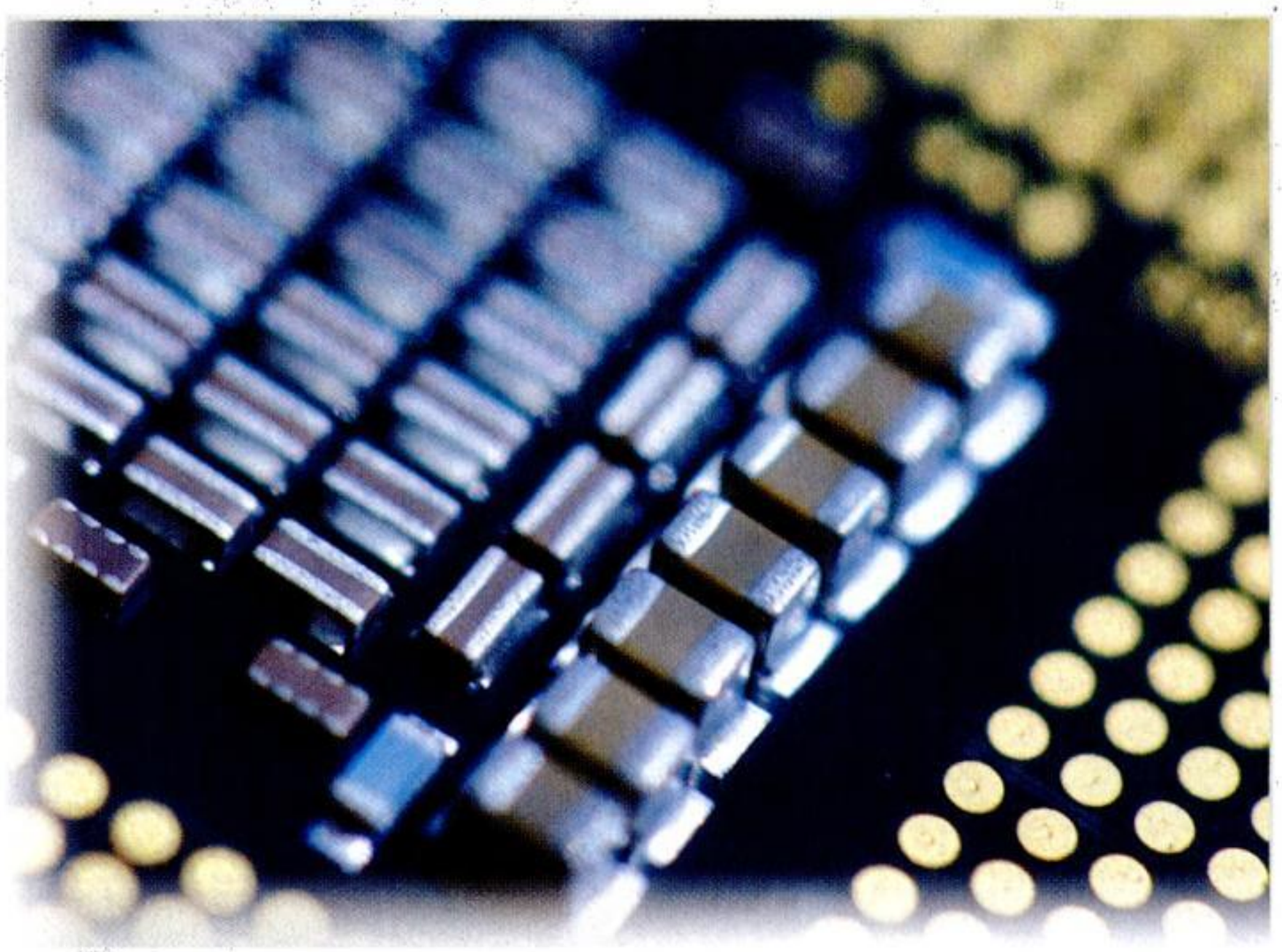
Quad-Core CPUs

Dual core? Bah! Prepare to double your execution cores—and possibly your performance—with quad!



Intel motherboards have lacked upgrade options of late, but the quad-core Kentsfield should drop right into any Core 2 Duo board.

The golden age of pure PC power has arrived. You might have thought the Pentium II or Athlon 64 marked the best of the best, but by comparison, those CPUs were nothing more than bronze and iron trinkets. Next year, power users will be treated to a utopia of computing performance that has never before been available to the average man or woman. We simulated quad-corism in 2004, when we outfitted our Dream Machine X with a pair of dual-core CPUs; now you can have that power for just a couple of car payments (as opposed to the entire cost of a car, as in '04).

Quad-core computing is an easy enough concept to understand: It's essentially two dual-core processors packaged in a single CPU. And it amounts to double the performance potential of today's fastest dual-cores, as well as the ability to run loads of CPU-intensive applications simultaneously. Here's what the duopoly of Intel and AMD have planned for you:

Now that Intel has finally wrenched the performance crown from AMD's head with Core 2 Extreme, it's not about to hand it back. The company plans to stay on top by releasing its quad-core CPU, code-named Kentsfield, *before* Christmas. Kentsfield borrows a trick from Intel's "Presler" Pentium D dual-core CPU. Unlike other dual-core procs that feature two cores on one die, Intel tied two single-core chips together inside the CPU to make Presler. With Kentsfield, Intel will marry two single-die Core 2 Extreme CPUs together to give the world a quad-core chip more than half a year ahead of AMD.

Intel hasn't said whether it will make any under-the-hood changes to Kentsfield, but the very idea of twice the Core 2 Extreme butt-stomping is promising. The only potential problem is with the front-side bus. With four CPU cores sharing the memory bandwidth of a single FSB, will data and instructions bog down like LA's rush-hour traffic? Thus, we're hearing word that Intel is pushing hard to introduce a 1,333MHz front-side bus (up from its current 1,066MHz FSB) to mitigate any gridlock. And this is just the beginning. In the second half of 2007, Intel will move on its 45nm fabrication process (down from the 65nm process of the Core 2 and Pentium D), which will pave the way for octo-cores near the end of this decade.

This might all sound like bad news for AMD, but that company isn't out of the running yet. AMD normally plays its cards close to the vest, but competitive pressure has the company slipping details that should keep its faithful followers happy. Its quad-core Athlon 64 will be built on a 65nm process and feature under-the-hood enhancements such as increased SSE performance, dual 128-bit loads per cycle, out-of-order load execution, an improved branch predictor, and other extras that the company is confident will put it back on top. The on-die memory controller and fundamental Athlon 64 goodness will remain, of course. AMD will also embed PLL chips into each of the cores, so you can turn down the clock speed of individual cores on the fly when they're not needed—something you can't do with today's dual cores. The new chip will also allow AMD to add L3 cache as needed.

AMD no longer uses code-names for its CPUs, so we were going to call this quad-core beast Wookie Feet from now on. Unfortunately, a secret internal code-name—Greyhound—surfaced, so we'll just use that instead. AMD's HyperTransport, which replaces the front-side bus with a direct connection to the motherboard, should show its legs when eight cores are used.

An Opteron version of AMD's quad-core is on the table for next summer, with an Athlon 64 derivative to follow soon after. How they will compare with Intel's efforts is of course unknowable at this point, but some speculate that AMD's plans are what convinced Dell to finally switch from Intel-only status. Still, there's no question that six or eight months is a long time to lag behind your competition.

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PC DVD-ROM SOFTWARE

The way it's meant to be played. NVIDIA.

DIGITAL REALITY

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Wireless

Three emerging standards offer greater freedom from cables

802.11N

There are just two certainties about next-gen wireless local networking: The IEEE standard will be called 802.11n, and it will be based on spatial multiplexing MIMO. Everything else is up for grabs, including whether or not current MIMO and Draft N equipment will be compatible with whatever standard finally emerges from the IEEE—in 2008.

In the meantime, the Wi-Fi Alliance—fearing that disgusted consumers will refuse to buy *any* new wireless gear—has reversed its longstanding prohibition against issuing its stamp of approval in advance of IEEE standards: The industry group will begin certifying pre-standard IEEE 802.11n hardware in March 2007.

No one knows what genuine IEEE 802.11n products will look like, because the spec won't be finished until 2008. But that won't stop the Wi-Fi Alliance from placing its stamp of approval on gear that adheres to Draft 2.0 of the standard, beginning March, 2007.

The organization expects that certified pre-standard products will be interoperable with those based on the final IEEE 802.11n standard, but cannot guarantee it: "The ratified IEEE 802.11n is likely to include a larger set of features…," said Wi-Fi Alliance Managing Director Frank Hanzlik; "We believe the maturity of the baseline features in the pre-standard certification diminishes the risk that products won't comply with IEEE 802.11n when it is ratified."

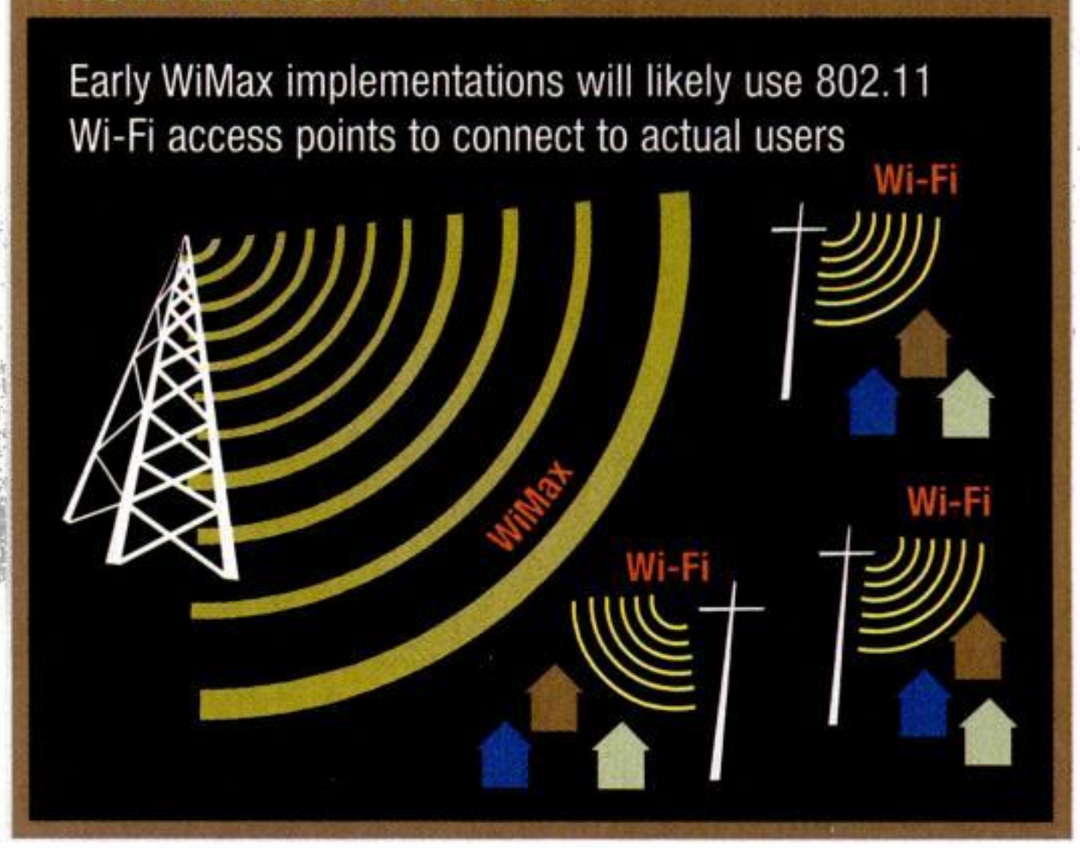
WIMAX

Nearly everyone uses Wi-Fi these days—the technology provides us with reliable wireless networks in our homes and offices. But once we leave our home turf and our wireless signal fades, we're left with just expensive cellular wireless or, even worse, no Internet at all. That's where WiMax steps in.

Instead of small pockets of high-speed 802.11-based wireless networks, WiMax (aka 802.16) delivers high-speed wireless to city-size areas. Although WiMax isn't compatible with Wi-Fi hardware, you probably won't need to buy a special adapter to take advantage of the technology. Many cities rolling out municipal networks are using bridges that connect local Wi-Fi users to the Internet through a WiMax network. Instead of spending hundreds of millions of dollars running fiber to every utility pole in the city, a WiMax provider simply connects a Wi-Fi/WiMax bridge to power, and *voila*—instant Internet!

WiMax speeds vary greatly depending on distance from the tower and number of channels, but we expect to see overall bandwidth in the 40Mb/s range shared between all users of a WiMax node.

How WiMax Works



WIRELESS USB AND ULTRA-WIDEBAND

Do you hate wires? We sure do. Luckily, Ultra-WideBand radio technology looks like it could help eliminate that snarl of wires behind your PC.

The idea is simple: Instead of trying to squeeze more bandwidth from a tiny slice of the radio spectrum, Ultra-WideBand technologies use a massive slice of spectrum, 500MHz or more, for an extremely brief period of time. While the range for such a signal is extremely short, you can send a tremendous amount of data using UWB, without hogging the entire spectrum and interrupting the connections of everyone around you.

So why do you care about UWB? Because it's the technology behind Wireless USB, which will provide a maximum of 480Mb/s of bandwidth between your wireless peripherals at about three meters. (The further your signal travels, the less speed you'll get—down to 110Mb/s at about 10 meters.) While you don't need that kind of speed for your mouse and keyboard, we expect to see Wireless USB integrated into digital cameras, camcorders, cellphones, hard disks, and printers.

Ultra-WideBand technology will also appear in other high-bandwidth wireless applications—there's even talk of a wireless HDMI spec to ease communication between your PC and your monitor. It's very important to note that Wireless USB and WirelessUSB (no space between words) are two different technologies. WirelessUSB delivers a mere 1Mb/s at 10 meters range, using the established 2.4GHz band.

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AS REAL AS IT GETS

CONGRATULATIONS. YOU'VE Rrighted YOUR PLANE. NEXT UP: EMERGENCY LANDING IN THE JUNGLES OF THE CONGO.

After that, let's see you rescue an injured climber on Mt. Kilimanjaro. Or take on the world's best pilots in the Red Bull Air Races. With 23 aircraft and over 50 real-world missions, it's the most realistic version yet. Whole cities and airports have been faithfully recreated, with a 16X overall improvement in terrain graphics. Suddenly, calling it a "simulator" just doesn't seem right.

(ACTUAL GAME SCREEN SHOT)

Microsoft game studios

Games for Windows

Play to win with intel Core 2

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Optical Drives

Format war shows no sign of abating

The original DVD-R-vs.-DVD+R format war lasted more than two years before ending in today's stalemate of dual-format burners. We'd like to think that cooler heads will prevail in Disc World War II, but it's not looking good. Both Blu-ray and HD-DVD camps appear dug in for protracted trench warfare.

In the end, we'll likely end up with a semi-armistice like the one we have today: drives that can read and write both formats. Ricoh recently disclosed it has a single laser and pickup capable of reading and writing both Blu-ray and HD-DVD discs. The part is expected to ship to drive makers by the end of the year. While drive manufacturers we spoke with said it sounds promising, they expect next year's multi-format drives to simply have two pickups: one for Blu-ray, one for HD-DVD. That will likely keep the price of drives in the stratosphere, as the yields of blue lasers—for HD-DVD and Blu-ray—were so poor that the pickups *alone* cost $300. Add in your royalty fees, DRM hardware overhead, and software package, and you shouldn't expect to see drives retail for less than $500 for the next couple years. Of course, drive manufacturers like to point out that DVD burners were just under $1,000 when first introduced, as well.

We see the blue-laser wars going two ways right now: HD-DVD is winning the movie war, with its VC-1/WMV9-encoded titles clearly superior to the first MPEG-2 Blu-ray movies, and there are far more titles already available for HD-DVD. On the data-storage and archiving front, however, Blu-ray has the advantage with its double-layer capacity already at 50GB and a 200GB eight-layer disc on the roadmap. HD-DVD capacities are comparatively underwhelming at 15GB per layer; even with its three-layer capability, the capacity is 5GB less than Blu-ray's double-layer media. Blu-ray also has the advantage of currently available hardware. Drive makers we spoke with say they don't expect the first desktop HD-DVD drives until the end of this year—and those drives will only *read* HD-DVD discs.

We expect to see next-gen high-def drives burn both Blu-ray and HD-DVD discs.

Even when blue-laser burners are widely available, you'll find there are few others who can enjoy your lovingly authored high-def discs—certainly not Mom with her ancient Pentium III machine with its DVD-ROM drive.

Hard Drives

Massive 1 terabyte capacities are just a taste of what's coming down the pike for storage

We've fawned over perpendicular recording before, and we spent much of 2006 enjoying the huge capacities that are possible when more bits are packed onto each platter—in both notebook and desktop drives. By orienting the tiny magnetic particles on the drive platters vertically, so they're perpendicular to the surface instead of parallel to it, drive manufacturers have boosted platter capacity at unheard of rates. Thus, it's a foregone conclusion that we'll see the first terabyte desktop drives in 2007—and we don't think hard drive manufacturers will stop there.

We're also expecting to see another update to the SATA spec toward the end of next year. Third-generation SATA should deliver about 600MB/s theoretical maximum bandwidth between your hard drive and your system. Of course, with current SATA drives barely saturating the first-generation SATA 150 bus, drive manufacturers aren't in a huge rush to roll out the new technology.

The big push next year will be for more rugged, mobile-friendly hard drives. The next-gen drives will be less temperamental and better suited to hostile environments—including the interior of automobiles. The inside of your car can hit temperatures of anywhere from -20 F to 140 F, depending on the climate. In addition to extreme temps, hard drives in cars must withstand the constant jarring, acceleration, and sudden stops that occur while driving. And they have to survive for the lifetime of the vehicle—well beyond the typical five-year lifetime of a desktop hard drive.

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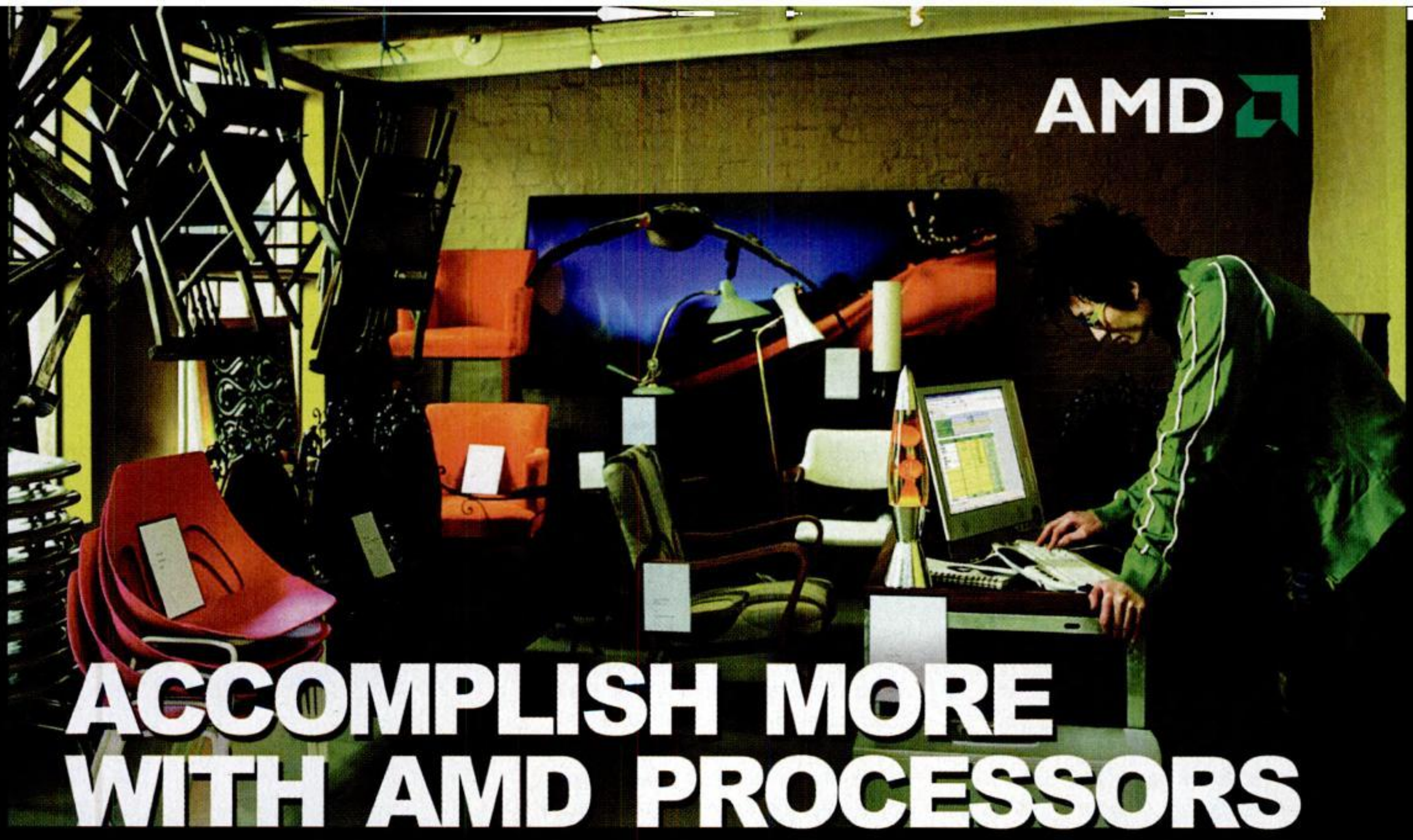

ACCOMPLISH MORE WITH AMD PROCESSORS

Athlon™64 X2 4800+* (Socket AM2)

- Part Number: 80728-9
- Code Name: Windsor
- Thermal Power: 65W
- L1 Cache: 128KB x 2
- L2 Cache: 1MB x 2

Athlon™64 X2 4600+* (Socket AM2)

- Part Number: 80727-9
- Code Name: Windsor
- Thermal Power: 65W
- L1 Cache: 128KB x 2
- L2 Cache: 512KB x 2

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- Code Name: Windsor
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PCI Express 2.0

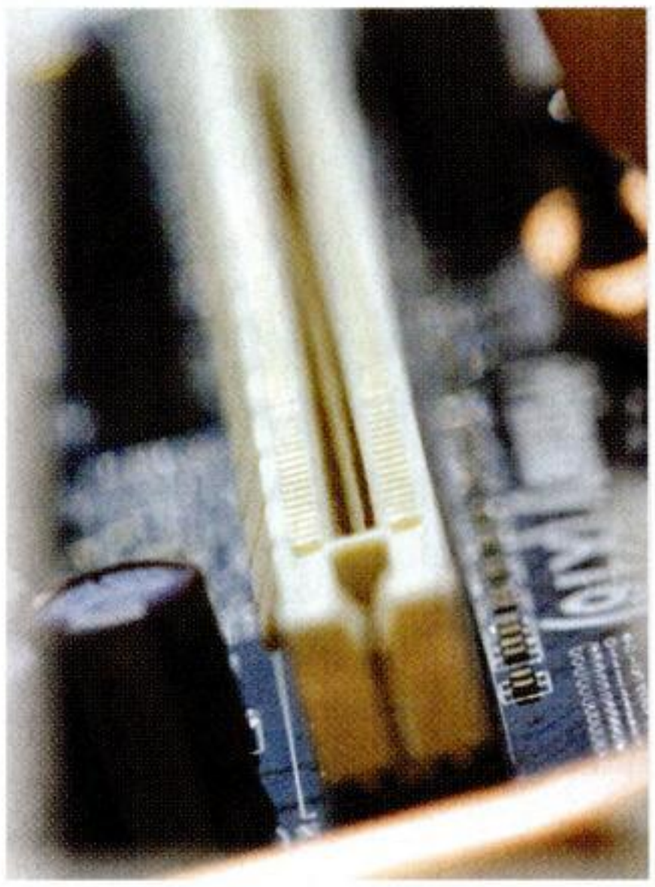
The next generation of PCI-E doubles the speed from 2.5GHz per wire to 5GHz per wire

Ahh, if only state transportation departments thought this way: build-in more bandwidth *before* the traffic gets congested. In the case of PCI Express 2.0, the roads don't get wider, the speed limit increases. Rather than bumping up the PCI-E lanes from x16 to x20 or x32, PCI-E 2.0 doubles the speed for each existing lane of traffic. The upshot is that a x16 PCI-E gen-2 card will be capable of moving 16GB/s of data (8GB/s in and 8GB/s out) versus 4GB/s each way for a x16 PCI-E gen-1 part.

If you just bought a hot new PCI-E graphics card yesterday, don't worry. PCI Express 2.0 is backward-compatible. Plug a first-generation device into a second-generation motherboard and the board will automatically shift down in speed. The PCI SIG—the group responsible for thrashing out the spec—said that although backward-compatibility limited the speed increases, it was one of the most important features of the new spec.

Because it's compatible with current hardware, PCI Express 2.0 slots should look identical to first-gen hardware. And mobo vendors are hopeful that the new spec will be drop-in compatible with existing motherboard designs. The new spec will also include a final external cable spec for running PCI-E devices outside the PC.

We expect to see the first PCI-E 2.0-equipped motherboards by next summer. Neither Nvidia nor ATI have announced support yet, but we expect both companies to release products that support the higher speeds soon after the motherboards are available.



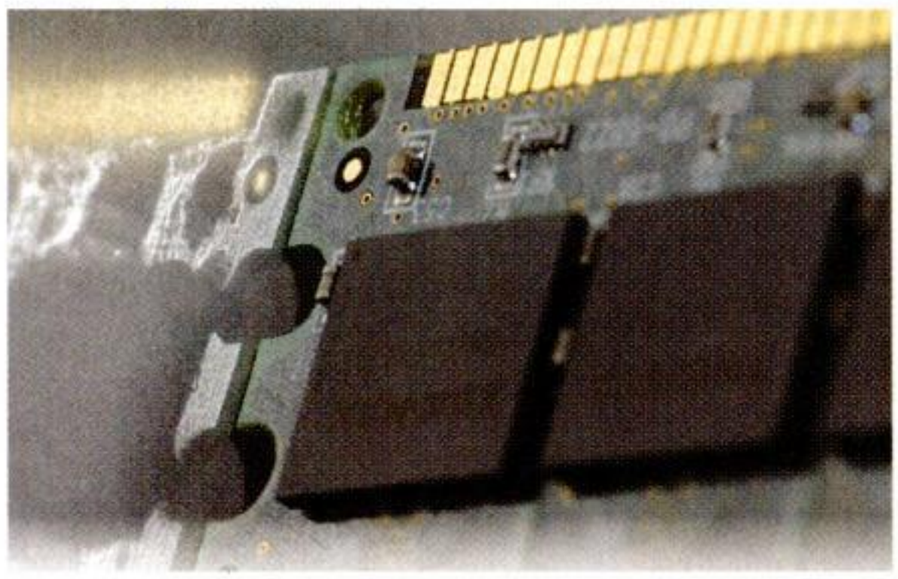
PCI Express 2.0 will be backward-compatible with current PCI-E hardware.

Memory

Get ready to trash your DIMMs again when DDR3 comes out next year

Revolutionary changes to system RAM went out the window when Intel was forced at gunpoint to kick Rambus' Direct RDRAM to the curb for DDR. While DDR has been an overall success for all concerned, DDR2 has been more of a mixed bag, with critics still smack-talking the new memory technology—even with AMD finally aboard the DDR2 train. After all, the added bandwidth of the new RAM architecture comes at a cost to latency.

Expect the critics to sharpen their long knives again when DDR3 rears its head sometime next year. Like DDR2, DDR3 drops the voltage—this time to 1.5 volts (DDR2 dropped to 1.8 from DDR's 2.5 volts)—which should benefit notebook users. The lower voltage is needed to push the frequencies higher for the RAM. DDR3 is expected to debut at DDR3/1066, or 1,066MHz, with 1,333MHz and 1,666MHz on the roadmap. DDR3 chips are already being fabbed by RAM makers, and modules are expected by the middle of 2007. Motherboard and chipset commitment isn't solid, but Intel's upcoming "Bear Lake" chipset is rumored to support DDR3. And interestingly, the DIMMs are expected to be similar to the 240-pin DIMMs for DDR2, but they'll of course be incompatible with existing motherboards.



Like the shift form DDR to DDR2, DDR3 will require a new mobo and new modules—again.

Next year, we'll also probably find out if JEDEC, the organization charged with approving spec changes to RAM, will approve Nvidia's EPP/SLI-ready memory initiative. (EPP embeds extended information into the module's SPD ROM to make overclocking easier.) Things could get sticky, however—little birdies tell *Maximum PC* that ATI has a competing initiative before JEDEC that is different than Nvidia's. Who will win? Probably no one. The August JEDEC group, which approves worldwide RAM standards for hundreds of millions of computer users, is unlikely to approve any spec change that interests just a small subset of power users. That will leave us in a quandary over which type to support. Fortunately, modules designed for either EPP or ATI's version should work fine in manual modes.

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Direct3D 10

Microsoft wipes the graphics slate clean

Maintaining backward-compatibility is a drag for both developers and consumers. Developers must write spaghetti code to accommodate all manner of yesterday's hardware, leaving consumers saddled with bloated software that fails to take full advantage of their state-of-the-art gear. Direct3D 10, the upcoming graphics component of Microsoft's DirectX, promises to buck that trend.

For the first time since introducing the DirectX collection of APIs more than 10 years ago, Microsoft is jettisoning the entire concept of backward-compatibility: Not only is Direct3D 10 designed exclusively for Windows Vista—rendering it incompatible with every previous version of Windows, including XP—it also requires new hardware to run as intended. And that's a *good* thing—honest.

The decision to throw the baby out with the bathwater couldn't have been easy for Microsoft, but it enabled the Direct3D team—in consultation with ATI, Nvidia, Intel, S3, and others—to spend more than three years rethinking this critical tool. Here's a high-level look at what we can expect from the next generation of Direct3D.

Until there's a healthy installed base of Direct3D 10 videocards, game developers such as Crytek will undoubtedly produce hybrid games capable of falling back to Direct3D 9.0 hardware.

A WHOLE NEW PIPELINE

Three-dimensional graphics are created by sending rudimentary objects through a programmable pipeline to emerge as richly detailed objects at the other end. Previous versions of Direct3D envisioned two separate virtual machines—a vertex-processing engine and a pixel-processing engine—that could perform operations on vertices and pixels as they moved through the pipeline. Direct3D 10 adds an entirely new stage to the pipeline: a geometry-processing engine.

Each of these engines executes specialized chunks of computer code, called shaders, which enable software developers to create simple wire-frame models and then transform them into extremely complex-looking objects complete with depth and realistic lighting. Vertex-shader programs manipulate points in three-dimensional space—identified by X, Y, and Z coordinates—to create a simple 3D object known as a primitive.

In Direct3D 9.0, the vertex shader hands the primitive off to the rasterizer, which breaks the object down into pixels—the smallest elements that comprise an image. A pixel-shader program then goes into action to process these individual pixels, assigning attributes such as color and lighting effects to each one. Direct3D 10 places the new geometry-shader virtual machine in between the vertex shader and the rasterizer to perform additional operations on the primitive before the rasterizer breaks it down.

Vertex-shader programs are limited to manipulating individual vertices, but geometry-shader programs can operate on *all* the vertices that make up a primitive at once. What's more, a geometry shader can create entirely new primitives based on an incoming original. For example, a geometry shader might increase the number of objects it outputs to the rasterizer by cloning a primitive it receives from the vertex-processing engine. Or it could subdivide that primitive into hundreds of smaller objects.

A geometry shader can assign additional attributes to a primitive, as well. It might take a triangle and extrude its edges to create a tetrahedron, for example. It can also reduce the workload on the pipeline stages that follow it by taking a primitive from the vertex shader, determining that the primitive will ultimately not be seen in the final image—perhaps because it will be obscured by other elements in the scene—and then not outputting that object to the next stage in the pipeline.

A UNIFIED SHADER ARCHITECTURE

Modern GPUs feature parallel pipelines, so that several operations can be performed on several primitives—and then several streams of pixels—at the same time. And because pixel-shading operations tend to be more compute-intensive than vertex-shading operations, most GPUs have more pixel shaders than vertex shaders.

ATI's Radeon X1950 XTX, for instance, has eight vertex-shader units and 16 pixel pipelines, but 48 pixel-shader units—three

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for each pixel pipe. Nvidia's GeForce 7900 GTX, on the other hand, maintains a one-to-one relationship between pixel pipelines and pixel-shader units—there are 24 of each, plus eight vertex-shader units. In both cases, however, vertex-shader units are strictly limited to executing vertex-shader routines, and pixel-shader units are strictly limited to executing pixel-shader code.

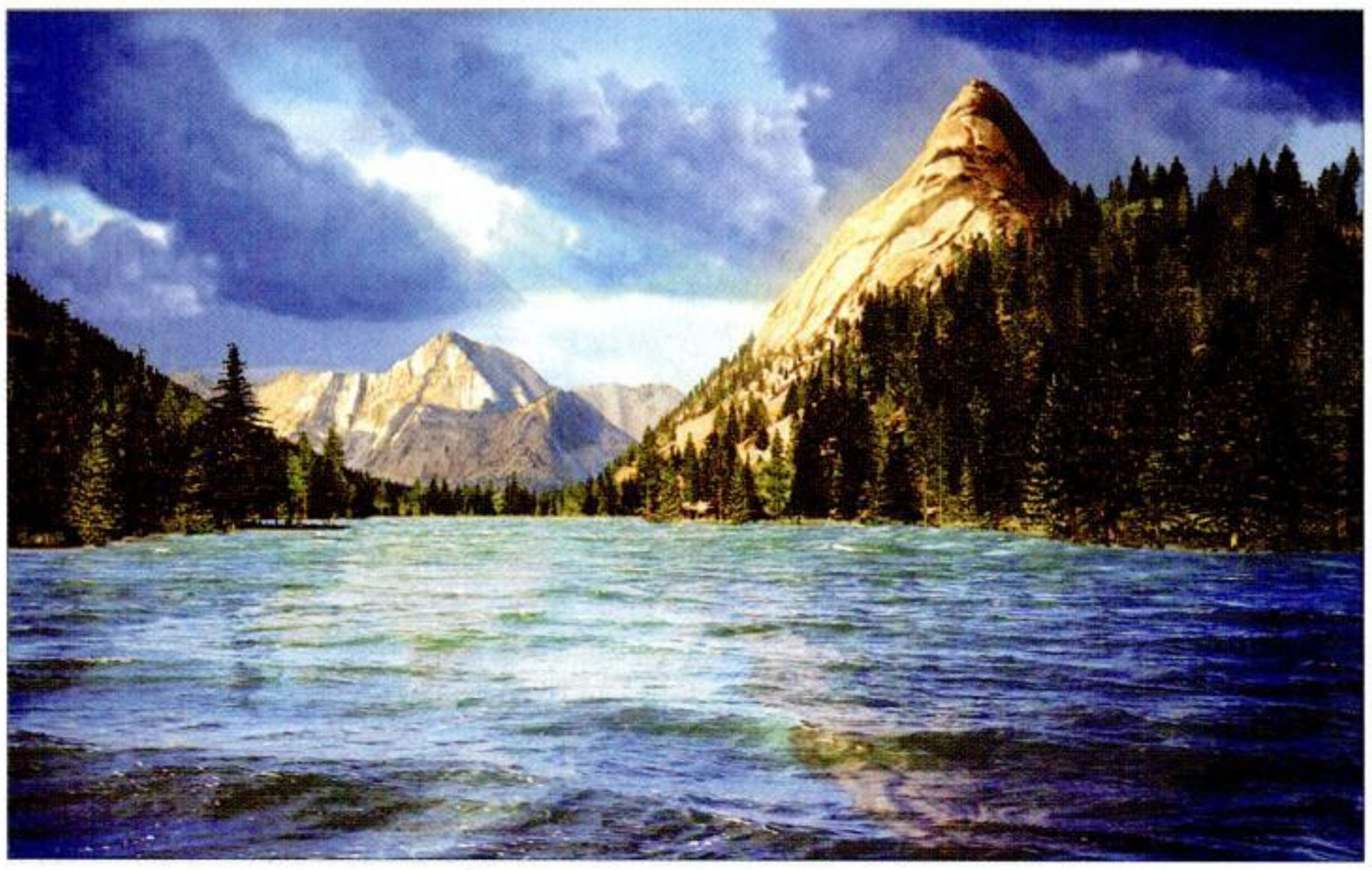
Microsoft considers these designs an impediment that should be done away with. The way Microsoft sees it, if the GPU is in the midst of performing intense geometry processing, its vertex-shader units will likely be fully utilized while its pixel-shader units are left with little or nothing to do. By the same token, if the GPU is faced with a heavy pixel-processing workload, its pixel-shader units might get bogged down while its vertex-shader units twiddle their proverbial thumbs.

Microsoft designed Direct3D 10 to favor a unified shader architecture: Instead of relying on GPUs with discrete units dedicated to executing either vertex-, geometry-, *or* pixel-shader programs, the new Shader Model 4.0 is designed to run on common shader-processing engines that are capable of performing *any* of these three operations. A thread arbiter on the GPU will analyze the incoming workload and assign appropriate processing resources for the incoming shader programs; that way, no processor power goes to waste while waiting for work to travel down the pipeline.

GPUs built around Direct3D 10 and Shader Model 4.0, Microsoft contends, should be capable of rendering more objects, materials, particles, vegetation, and shadows while consuming fewer CPU cycles and requiring less memory bandwidth. This will become particularly important if physics acceleration gains a toehold, whether that work is performed by a dedicated coprocessor, such as Ageia's PhysX PPU; a second videocard in a dual-GPU system like CrossFire or SLI; or on a second, third, or fourth core in a new CPU architecture.

In another major departure from Direct3D 9.0, hardware must support all but a very few features of Direct3D 10 in order to be considered Direct3D 10-compliant. In the current generation of GPUs, videocards such as ATI's X800 series were labeled Direct3D 9.0-compliant even though they weren't capable of executing Shader Model 3.0 instructions; by the same token, Nvidia's latest GPUs remain incapable of performing both high dynamic-range lighting and antialiasing at the same time. With the exception of a few very high-end features, Direct3D 10 is an all-or-nothing affair.

Microsoft expects everyone to benefit from this requirement: Software developers—especially game publishers—will feel empowered to create more sophisticated products, because they'll have confidence that consumers will have the hardware required for a good experience. Consumers will be able to buy videocards without having to read the fine print to determine if they support a key feature. And videocard and GPU manufacturers can continue offering a range of products targeted at low, medium, and high price points.



Since neither ATI nor Nvidia are yet shipping their next-generation graphics processors, Microsoft could only provide us with this artist's rendering of what Flight Simulator X will look like running on Direct3D 10 hardware.

WHAT'S NEXT FOR ATI AND NVIDIA?

We asked representatives from both ATI and Nvidia for their take on Direct3D 10 and Shader Model 4.0. Considering the competitive relationship between the two companies and the fact that they're both readying Direct3D 10 GPUs for shipping, the answers we received were, not surprisingly, guarded. We'll provide each company's official line along with the most-repeated rumors and our own educated guesses as to what they'll do next.

ATI has gone on the record that its first DirectX 10 part—code-named the R600—will use a unified shader architecture; in fact, ATI has already built one such chip: the Xenos GPU used in Microsoft's Xbox 360 gaming console. ATI's justifications for this decision parallel Microsoft's: namely, that Direct3D 10 will reduce the overhead that developers must contend with in Direct3D 9.0. ATI claims that the R600 will substantially outperform previous-generation hardware when it comes to running Direct3D 9.0 games, too.

Rumor has it that the R600 will feature 64 shader units that can be dynamically assigned to run vertex-, geometry-, or pixel-shader routines. As for a release date, ATI would tell us only that it's not tying its product launch to Microsoft's Vista timetable. That ambiguous answer could mean the part will ship after Vista is released, but the smart money is on a late-2006 date.

Nvidia has been more circumspect on the subject of architecture, declining to state whether or not its first DX10 part—code-named G80—will feature uni-

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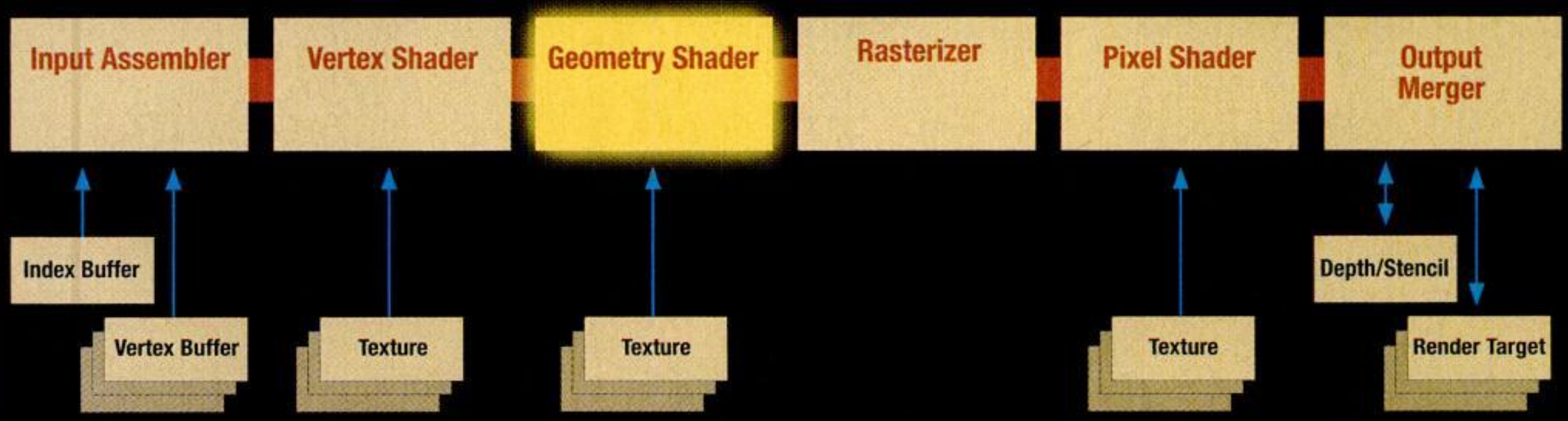
fied shader units. Nvidia's chief scientist, David Kirk, however, has been widely quoted as saying that a unified architecture isn't necessarily superior to having single-purpose units. Indeed, a GPU need not be based on a unified architecture in order to be DX10-compliant. The only official comment Nvidia was willing to provide is that the company's next-generation GPU will fully support Direct3D 10 while "continuing to improve [performance with] the current DirectX APIs."

The rumor mill says the G80 will have either 32 or 48 pixel-shader units and 16 vertex-shader units that will also handle geometry-shading chores. If this is true, the G80 could be considered a hybrid design because those combo vertex/geometry shader units are pulling double duty. We speculate that Nvidia is hedging its bets for two reasons: First, the company doesn't have any experience building unified shader units, so going to a hybrid architecture as an interim step entails less risk. Second, most developers won't build games that require Direct3D 10 hardware until there's a substantial installed base. Taking advantage of Shader Model 4.0, while continuing to hew closer to current programming practices, could give the company a performance advantage when it comes to real-world benchmarks. We won't know who has the better solution until we get both products in the Lab, but Nvidia says it fully expects to beat ATI to the Direct3D 10 punch, committing to announce and ship its new product before the Christmas holiday. MPC

Is the incredible detail in this *Crysis* shot courtesy of Direct3D 10 and Shader Model 4.0, or just skilled use of old-school D3D 9.0 and SM 3.0? Only Crytek knows for sure.

THE DIRECT3D 10 PIPELINE

The addition of a geometry shader marks one of the most significant changes ever made to Microsoft's Direct3D pipeline. Any videocard claiming Direct3D 10 compliance must have shader units capable of executing geometry-shader instructions.



The Input Assembler gathers data from up to eight streams attached to the vertex buffers and assembles the vertices.

The Vertex Shader transforms vertices from object space to clip space.

This newest stage of the Direct3D pipeline is capable of operating on the entire primitive all at once. It's also capable of spawning many vertices from a single source vertex.

Once the 3D object has been created, the Rasterizer breaks it down into its smallest components: pixels.

The Pixel Shader operates on the individual pixel fragments, assigning color and depth values to each pixel.

Pixels emerge from the Pixel Shader and enter the Output Merger, which performs stencil and depth-testing operations and render-target blending.

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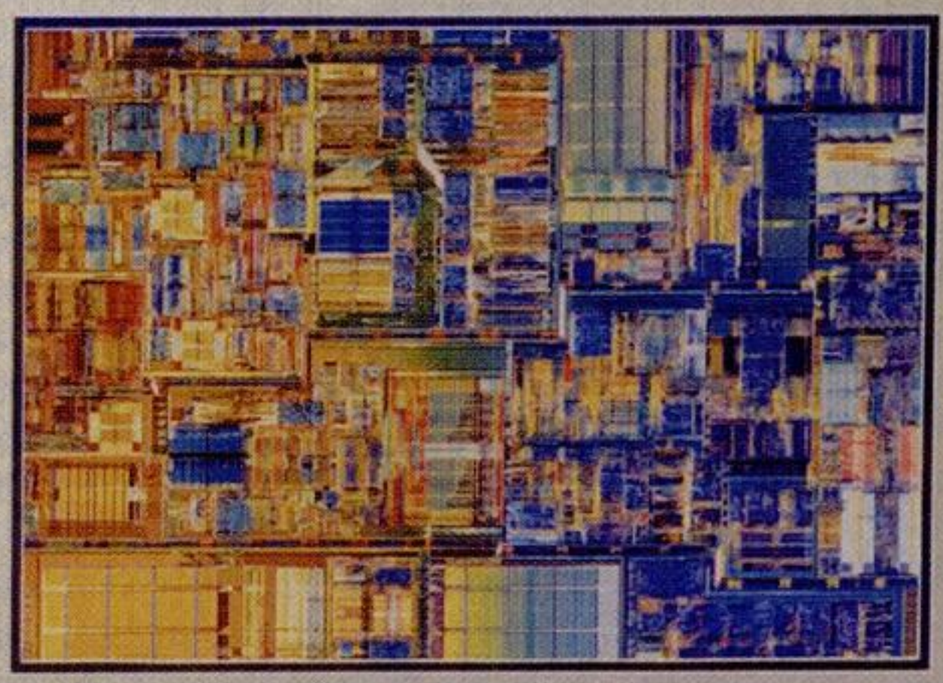
'Twas the night before Christmas, when we awoke with a start,
To the sound of stumbling, and cursing, and… *was that a fart?*
We jumped from our beds to find the cause of the racket,
And spied a pasty-faced stranger in a wrinkled red jacket.
In an instant, we understood what was afoot.
'Twas Nerd Santa come to visit, with a bag full o' loot.
Lo and behold, all his grand gifts of gear,
It's proof that we've been good 'n' nerdy all year.



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PHOTOGRAPHY BY MARK MADEO

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Magellan's RoadMate 6000T GPS is one know-it-all passenger we don't feel like strangling and stuffing in the trunk. We love rolling with the 6000T's map routing and audio turn-by-turn driving directions. More than mere GPS, the device can also receive real-time FM traffic alerts (subscription required), and a built-in speaker and mic facilitate hands-free calls from a Bluetooth phone. **$750, www.magellangps.com**

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You cut your creative teeth building intricate LEGO structures as a kid. Now it's time to get serious. LEGO Mindstorms NXT, the second-generation robotic building set for hardcore blockheads, lets you erect the robot of your dreams with four types of sensors, three motorized servos, and a Bluetooth-enabled smart brick that lets you program your bots to carry out your bidding. **$250, www.mindstorms.com**

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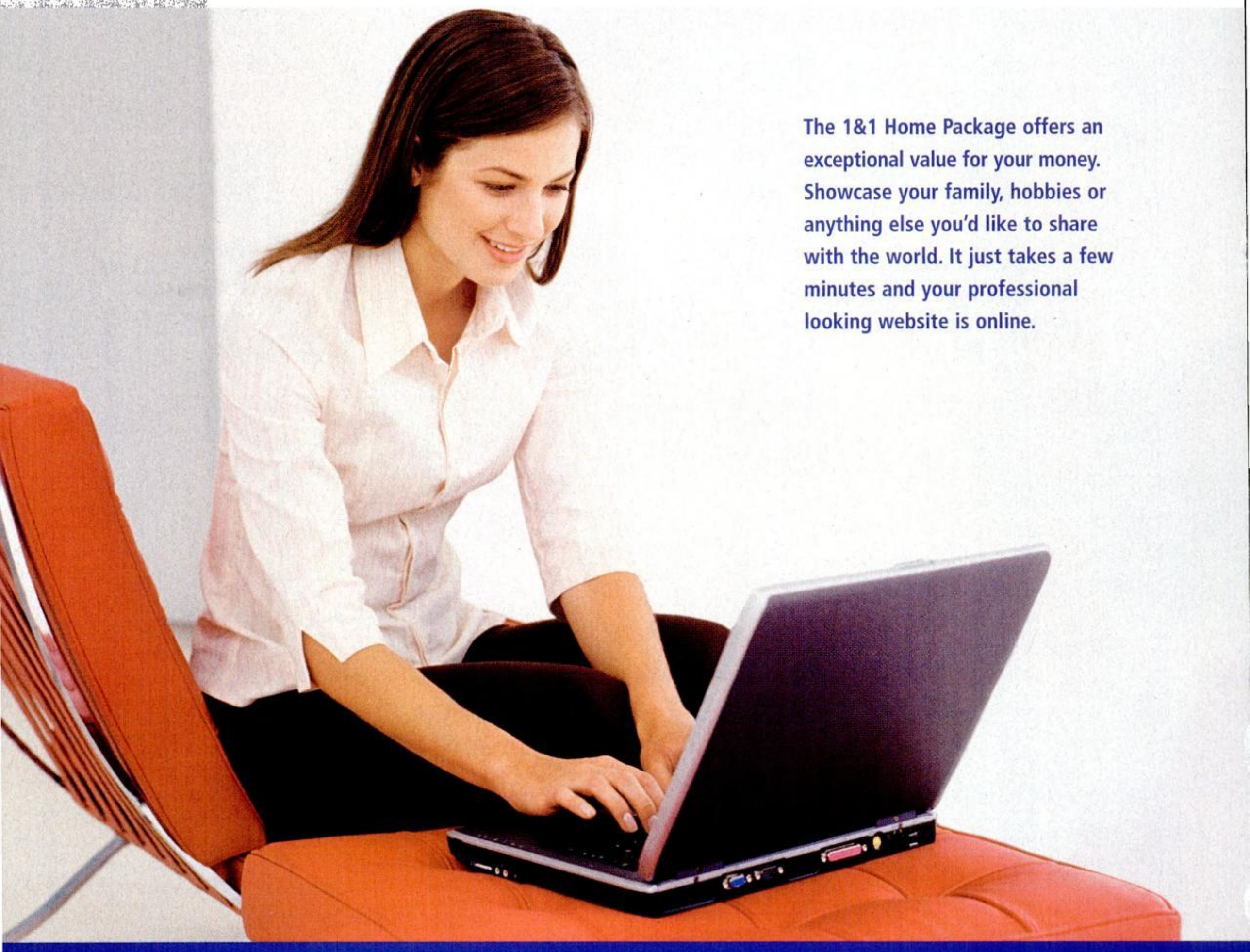

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Geographic Map	✓	✓	–
Website Builder	12 Pages	✓	Freeware
Flash Site Builder	12 Pages	–	–
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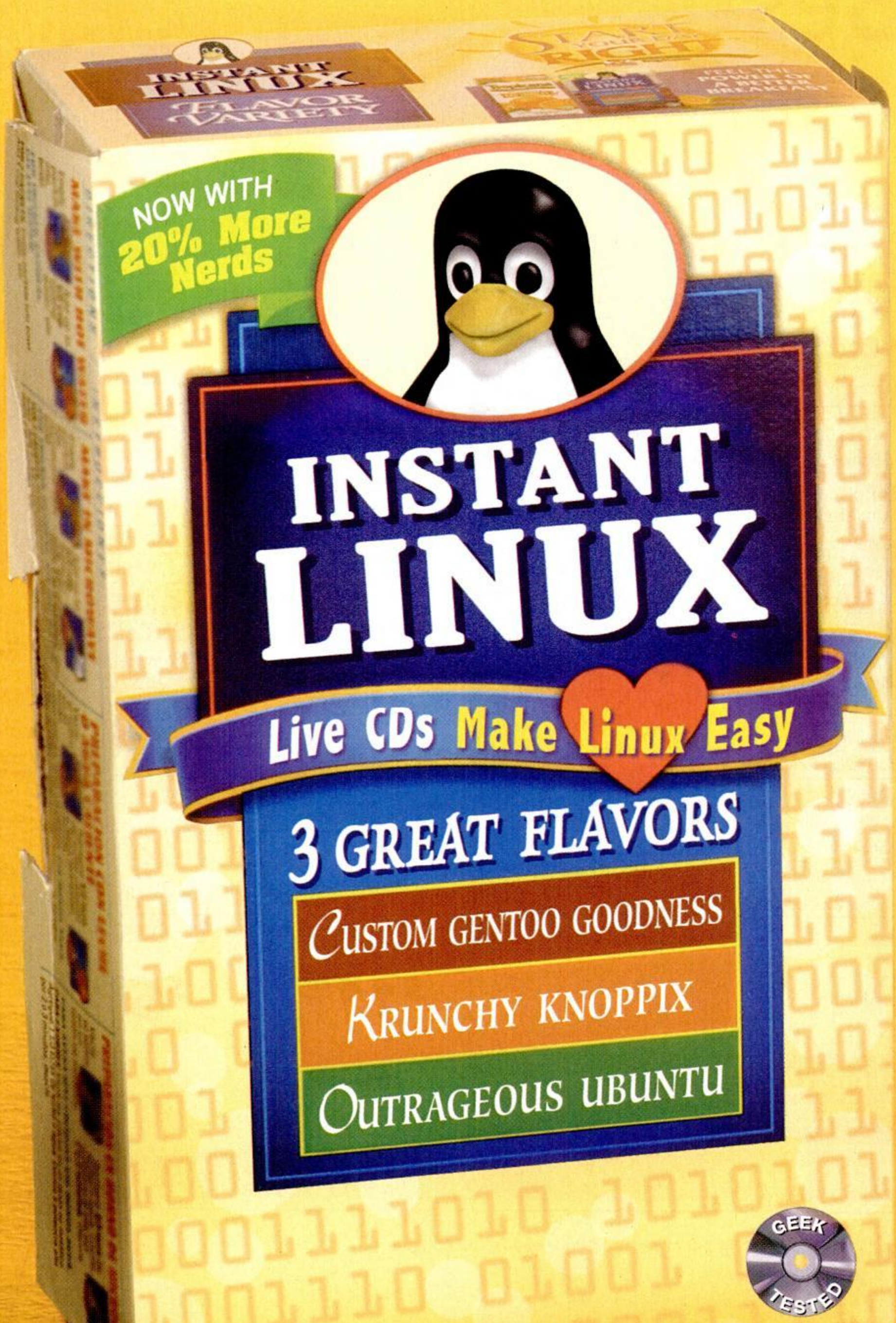

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We show you how to use Live CD distros to get Linux up and running on your PC in just a few hours—without any risk!

Yeah, we know what you're thinking. Either you've never run Linux and you think you never will, or you've been-there-done-that, and those painful memories of the cruel command line just won't let you go back. But if you haven't used Linux lately, it's time for a closer look, and taking that first peek is easier than it's ever been before.

With the advent of Live CD distributions, you don't have to give up a smidgen of disk space to take Linux for a test drive. All you need to do is burn a special bootable disk of the distro you want to try out and pop it into your optical drive. Unless you're running some really exotic hardware, the Live CD will detect your important computer parts, connect to the Internet, and let you test drive the most common applications you'll need to make the switch to Linux.

But running from the Live CD is just the beginning. Once you're in Linux, you're mere minutes from installing the OS on your hard drive for full- or part-time use. The question is: What flavor of Linux should you use? To find out, we rolled up our sleeves and put the latest distributions to the test.

For starters, we narrowed down the pack to three sweet choices that offer very different Linux experiences: Gentoo, Knoppix, and Ubuntu. (While we admire older core distributions such as Mandrake and Debian, they each have issues that make them too complex for Linux neophytes.) And then we show you how to dig into the best one of the bunch.

So turn the page and get to know your next OS.

BY ROBERT STROHMEYER

PHOTOGRAPHY BY MARK MADEO
COMPOSITED BY BONI UZILEVSKY

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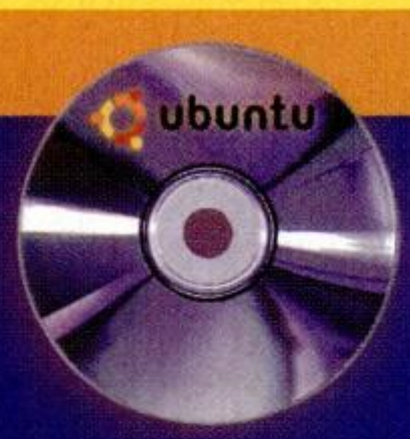
INSTANT LINUX

INSTALL UBUNTU

Three Steps To a Linux PC You Can Really Live With

We've found that Ubuntu is the only distro that offers that elusive blend of power, elegance, and ease-of-use that makes for a truly satisfying computing experience. Here's how to get it working on your PC.



STEP 1: Get It

All that stands between you and a fresh install of Ubuntu is a 700MB download and a blank CD. So go to www.ubuntu.com/download/ and grab the right version for your PC. There's an Intel i386 version, an AMD64 version, and even a Mac version, if you swing that way. For newbs, we recommend the i386 version, which greatly reduces potential hassles at the expense of a small performance hit. While you're downloading, you should defragment your drive and back up any data you wouldn't want to lose, should something go sideways during the install. Once your download is done, burn the image to a disc, insert it in your PC, and reboot.

STEP 2: Boot It

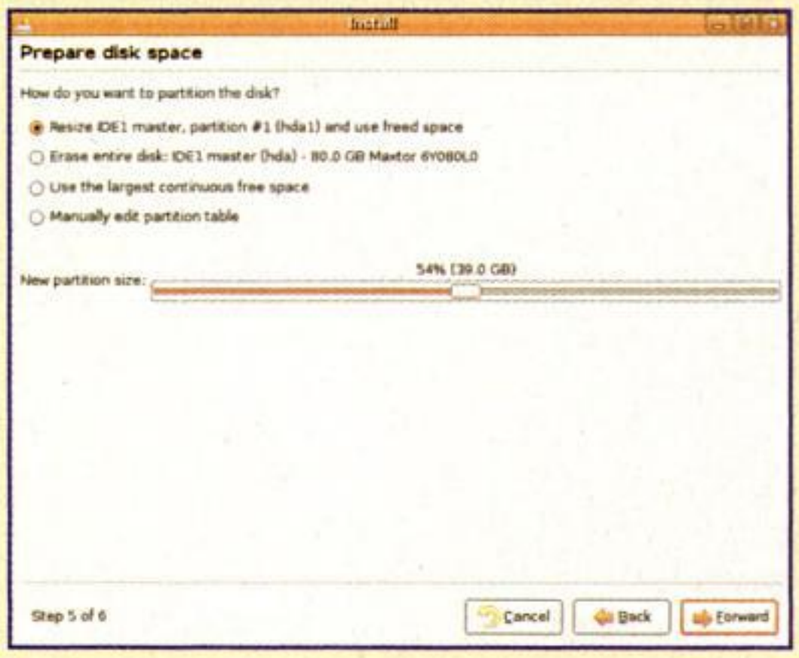
Once your PC has posted, you'll be presented with the Ubuntu splash screen. You can either manually select "Start or install Ubuntu" from the boot menu or wait 30 seconds for your rig to boot by itself. We're going to assume you've already taken Ubuntu for a test drive and are ready to dedicate some space on your hard drive to Linux. When your rig's booted into Ubuntu, double-click the big, friendly Install icon on the desktop.

Ubuntu's installer is built for comfort. If you don't choose a boot option within 30 seconds, it will start up in Live CD mode automatically.

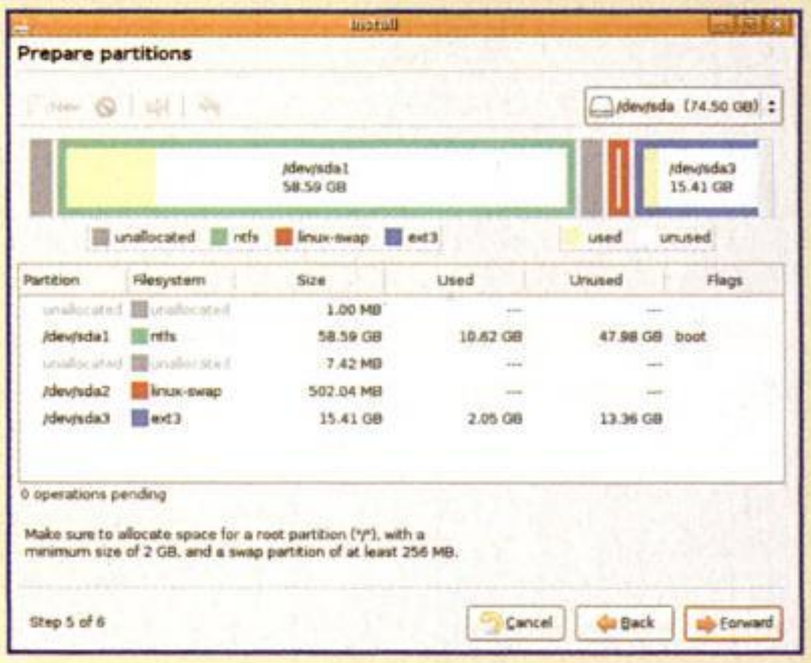
STEP 3: Root It

The most critical choice you'll have to make during the install is where to put the file system. If you're installing Ubuntu as the only OS on your rig, this part's a no-brainer. Just select "Erase entire disk" from the partition menu and click on through. If you're planning to dual boot Ubuntu and Windows, you'll have to do a little more decision making. Before you continue, make sure you've backed up any precious data from your Windows partitions.

If you've only got one hard drive and you're planning to dual boot, the installer can automatically repartition the drive for you using a handy slide control. This is the easiest way to go. However, more experienced users can specify their own partitions by selecting "Manually edit partition table." To manually partition, select your hard drive from the drop-down menu in the top-right corner of the partition dialog. Then set up at least one Linux-swap partition, which will contain your Linux install's virtual memory—256MB or more and at least one ext3 partition with at least a 2GB capacity to serve as Ubuntu's root.


Install
Prepare disk space
How do you want to partition the disk?
Resize IDE1 master, partition #1 (hda1) and use freed space
Erase entire disk: IDE1 master (hda) - 80.0 GB Maxtor 6Y080L0
Use the largest continuous free space
Manually edit partition table
New partition size:
54% (39.0 GB)
Step 5 of 6
Cancel
Back
Forward

To automatically resize your Windows XP partition and make room for Ubuntu, just slide this little control back and forth until you're happy with the balance of power. Make sure your Windows drive is defragged and backed up first!



If you choose to manually partition your drive, select which drive to modify from the top-right drop-down menu, then assign its size and type in the next screen.

CAUTION!

While Ubuntu's GRUB bootloader makes it easy to dual-boot Linux and XP, our experience with the Windows Vista beta has been far less satisfying. To learn how to make Ubuntu play nice with Vista, check out the excellent tutorial at **http://tinyurl.com/fy79b.**

INSTALLING VIDEOCARD DRIVERS

Ubuntu comes prepackaged with generic display drivers that should work reasonably well with pretty much any videocard. But why settle for "reasonable" when you could have kick-ass?

To get the latest drivers for your ATI or Nvidia card, or even for a laptop's Intel integrated card, go to **help.ubuntu.com/community/video**. The community-created documentation includes detailed setup and troubleshooting instructions for the most popular video hardware. If you don't find instructions for your card on your first visit, check back in a month or two. New drivers are being added to Ubuntu all the time.

While the install process does vary a bit depending on what card you've got in your machine, you can generally count on editing a few lines of text in /etc/X11/xorg.conf, running apt-get from the terminal command line, and giving the system a quick reboot.

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INSTANT LINUX

CONNECT TO THE NET

Configure Ubuntu for Wireless Networking

In our experience, Ubuntu works with just about any Ethernet card right out of the box. We've never seen it fail. But wireless networking in any Linux distribution is seldom a straightforward affair. Here's how to connect Ubuntu to your Wi-Fi world.

STEP 1: Launch Network Settings

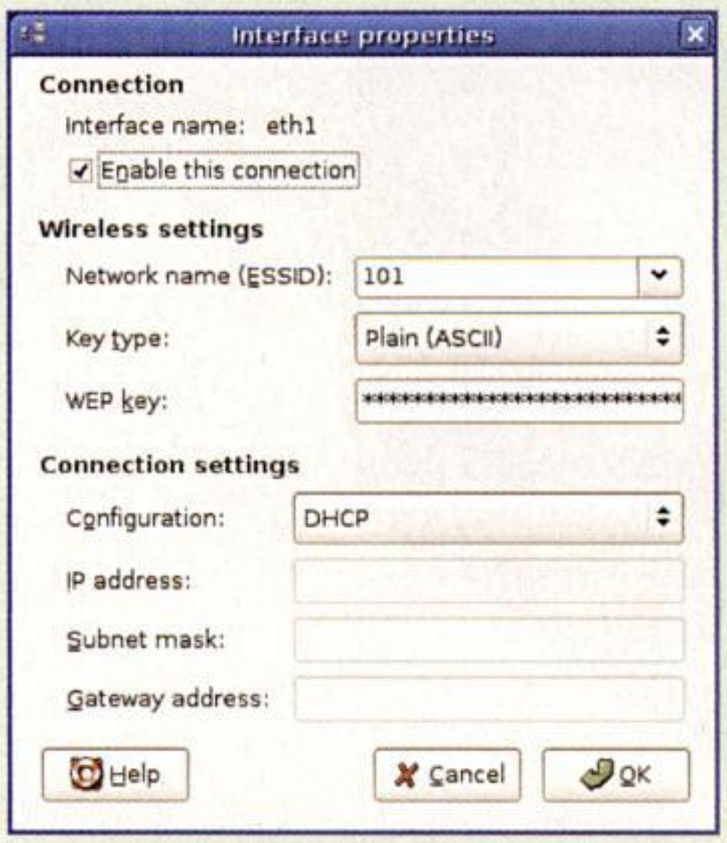
Ubuntu doesn't start wireless networking automatically during the boot process, so you'll need to wake it up manually. Click System > Administration > Networking to launch the Network Settings utility. If your PC's wireless card is supported, you should see it listed here. It might be listed as eth1, ath1, or even wlan0, and it will be labeled "Wireless connection."

There's nothing lamer than a lethargic wireless card. Put yours to work in the Network Settings pane.

STEP 2: Set Properties

To configure your Wi-Fi card for your home or office network, select it from the Network Settings menu and then click Properties. If "Enable this connection" isn't checked, check it. Then type your network's SSID into the "Network name (ESSID)" field. If your network uses WEP encryption, enter the WEP key, too. NOTE: Ubuntu doesn't yet support WPA encryption without some serious modding.

Most Wi-Fi networks use DHCP, which automatically assigns IP addresses to devices on the network. If your network uses static IP addresses, select "Static IP address" from the Configuration drop-down menu and then enter the correct IP address, subnet mask, and gateway address. When you're done, click OK to return to the Network Settings window.



To configure your wireless connection, type in the name of your network and the WEP key. Sorry, no WPA encryption here.

STEP 3: Activate

Once you've configured the card's properties for your network, just click Activate in Network Settings, then select your card from the "Default gateway device" drop-down menu and click OK. Launch *Firefox* and browse to a reliable website to test your connection.

STEP 4: Troubleshoot

If all goes well, you won't need this step. But like any Linux distro, Ubuntu's support for wireless hardware is still spotty and far from perfect. If this walk-through doesn't hook you up, you could be in for a long and arduous troubleshooting session. For instance, we spent countless hours hammering away at a particularly troublesome Broadcom wireless card that, at press time, still wouldn't work. If your hardware is giving you trouble, check the forums at www.ubuntuforums.org for sage advice from those who've traveled the path before.

ENTER THE 3D DESKTOP

You don't have to shell out big bucks for Windows Vista or OS X to get cool graphical effects in your user interface. Add Compiz and XGL support to your Ubuntu configuration, and you'll get more twisted effects than you can shake a title bar at. Transparent text boxes, shimmering backgrounds, watery windows, and cubed workspaces are just a few of the sweet features you can get, if you're willing to endure the upgrade.

To install Compiz on your Ubuntu Dapper Drake system, follow the instructions at **http://tinyurl.com/e4vqg**. You'll have to edit your sources.list file and run apt-get a few times to update all the required repositories and install the required packages, and then edit a few configuration files. The whole process is a little tedious, and won't necessarily work unless you have a relatively modern DirectX 9 videocard and the most recent drivers. But it's worth a shot, as it's unlikely to do any irreversible damage.

Make sure you've got a high-end ATI or Nvidia graphics card and are running the latest driver direct from the manufacturer before you begin installing Compiz. Once everything is configured, you can choose from a massive library of themes, including a few that closely mimic Windows Vista and OS X, or generate your own by customizing dozens of features and effects with the Compiz Themer.

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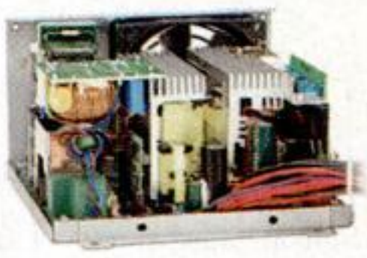

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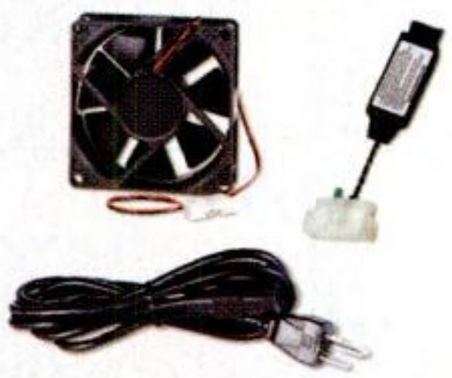

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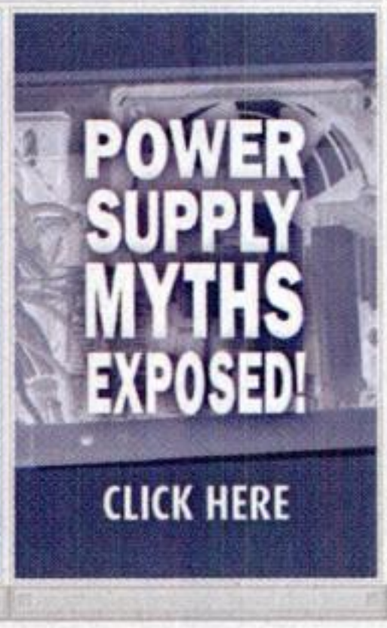

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INSTANT LINUX

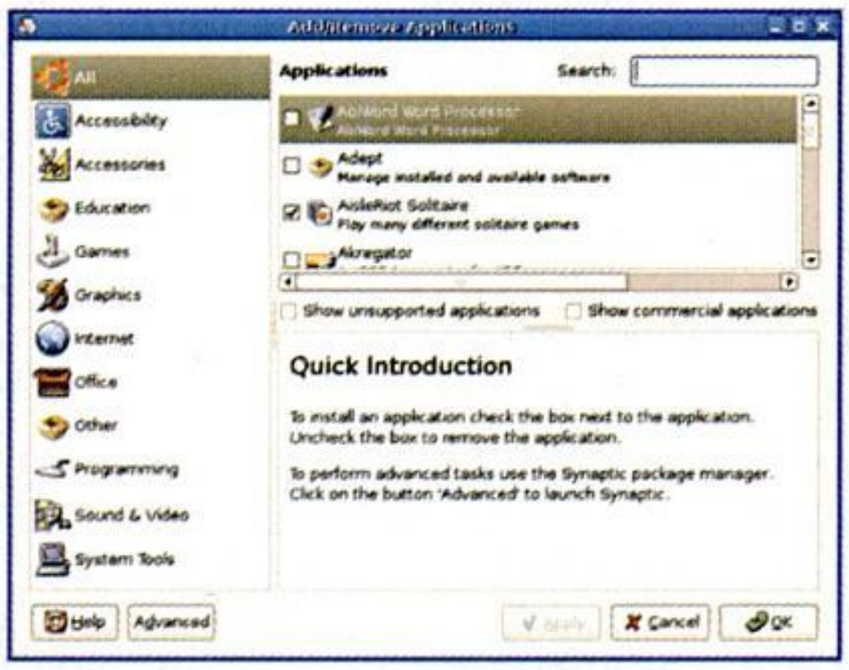
SOFTWARE MANAGEMENT IN UBUNTU

Boost Your Ubuntu with Apps and Utilities

Back in the 20th century, we seldom thought twice about wrestling with esoteric 72-character commands to customize our Linux installations. But this is 2006, and we've got better things to do. One of the things that makes Ubuntu the hands-down winner among user-friendly Linux distros is its killer package-management features, which make the process of adding new programs, utilities, and even kernel upgrades more, well, manageable. Here's how to add a new app to Ubuntu.

STEP 1: Run Add/Remove Applications

Like Windows XP, Ubuntu includes a simple utility for managing your installed apps. Unlike XP, however, it accesses an online list of available programs and tools that you can get just by clicking them. Click Applications > Add/Remove… to open the Add/Remove Applications utility.



Browse through the catalog of available apps to find groovy utilities for your Linux box.

STEP 2: Pick a Program

Add/Remove Applications gives you a massive list of programs to choose from in 11 different categories, ranging from Accessibility and Accessories to Games, Programming, and System Tools. Be sure the app you select will run in your desktop environment. Linux uses different desktop environments to draw all the goodies in its graphical interface. The most popular of these are Gnome and KDE. By default, Ubuntu uses the Gnome environment, so you should make sure any apps you choose are written for Gnome, not KDE. If you want to try KDE, download Kubuntu, Ubuntu's KDE-configured cousin. When you've found a program you want, check it and click OK.

STEP 3: Install It

Once you pick an app and click OK, you'll be asked to confirm your selection. Click Apply, enter your password, and Ubuntu will run out and grab the program from its source. The installation is pretty much automatic from this point, and unlike most Windows XP app installs, it isn't likely to bother you with a bunch of pointless confirmation screens or licensing agreements. If you do see a prompt, make sure you read and understand what it's saying—Linux installers that give error messages usually mean business.

MUST-HAVE APPS

OPENOFFICE

www.openoffice.org

Brought to you by the folks at Sun Microsystems, *OpenOffice* gives you a full suite of serious business apps to rival Microsoft *Office's* industry-standard programs. *OpenOffice* includes a word processor, a spreadsheet app, a database program, and a presentation app. These aren't quite as polished as Microsoft's budget-busting suites, but they produce compatible documents and offer very similar interfaces. And we've never heard anyone complain about the price.

GIMP

www.gimp.org

GIMP is to Adobe *Photoshop* what *OpenOffice* is to Microsoft's ubiquitous office suite. This wicked-powerful app lets you edit photos and create illustrations, and it supports a host of cool plugins to extend its graphical domain.

MOZILLA FIREFOX

www.getfirefox.com

Forget *Internet Explorer*. This is Linux, remember? Mozilla's *Firefox* browser is just as sweet here as it is in Windows XP, and it offers the same awesome array of plugins. (You may just have to drop into the command line to install them.)

EVOLUTION MAIL

www.novell.com

Sure, you could run *Thunderbird* to accompany *Firefox*, but Novell's *Evolution Mail* gives you mail and a whole lot more. Like the full-featured Microsoft *Outlook*, *Evolution* includes a calendar, a robust contact manager, memos, and interactive task lists. It's got everything you need to stay on top of your work life.

WHERE TO GET HELP

Ubuntu may be free, but it's not without support. In fact, it's about the best-supported Linux distro we've ever seen. Most of you will do just fine with the community-based support option. Check out the forums at **www.ubuntuforums.org** for smart tips from experienced users, and share your own insights to give back to the community. There's also a great wiki at **wiki.ubuntu.com**.

If you need serious hand-holding, you can opt for paid tech support from a commercial operator. Check the Ubuntu Marketplace at **www.ubuntu.com/support** for details. MPC

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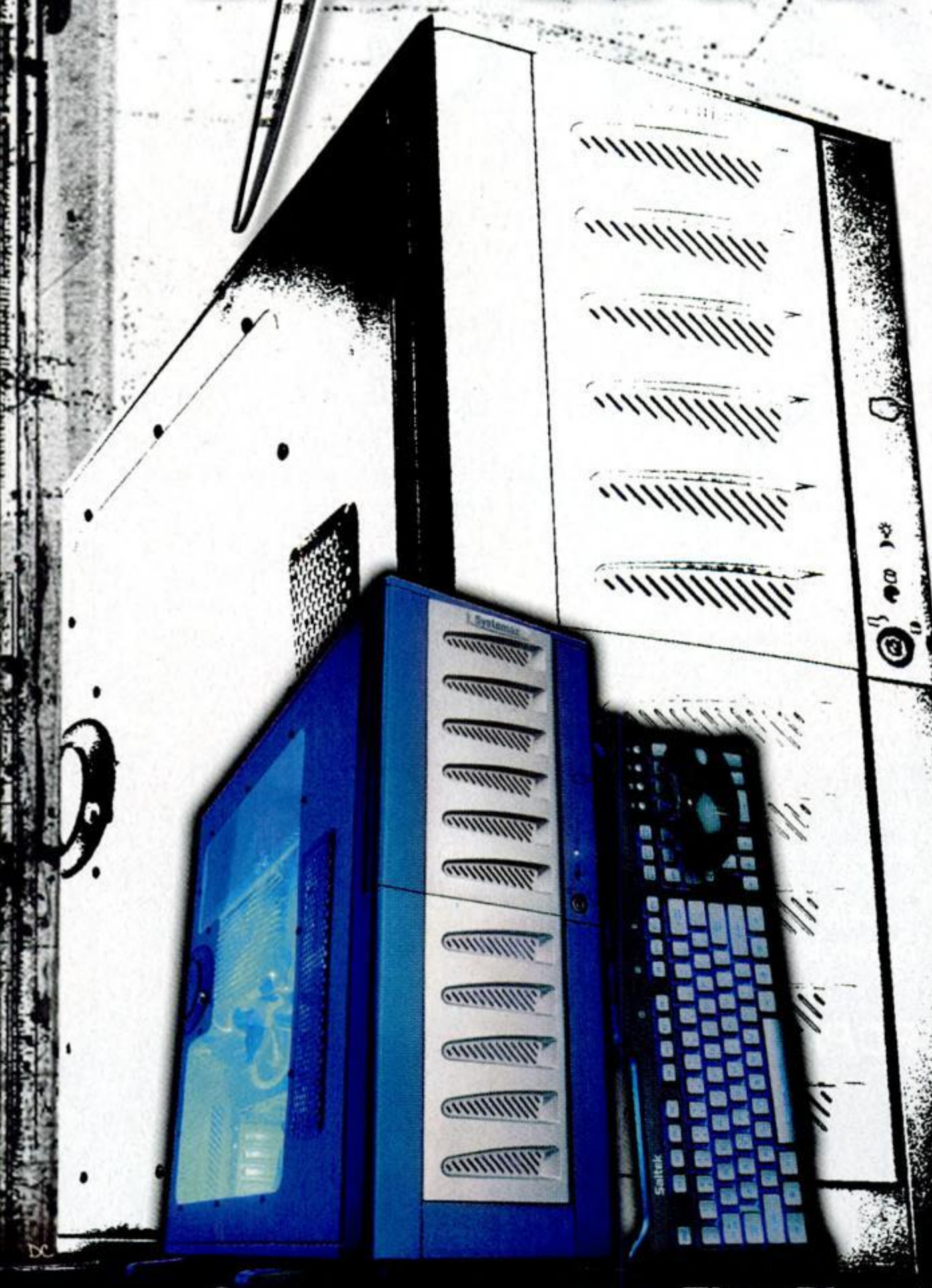

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Podcasting mixes two of our favorite things here at *Maximum PC*: technology and power. The chance to broadcast for free over the Internet while millions of eager listeners download your thoughts to their PCs and MP3 players—hey, what's not to like? From indie music performances to educational programs to goofball comedy, there's room in the podcasting universe for whatever you want to do.

The podcast formula can be broken down into three simple acronyms: MP3 + XML + RSS. That is, create an MP3 sound file, write its location in a snippet of XML, and distribute it to the world automatically via an RSS feed. It's easier than it sounds—we'll walk you through the whole process.

We're going to assume you want to record a conversation between multiple people for your podcast—a popular talk-show-style format in podcastland. Once you figure out what you're going to talk about and round up a few guests, you'll be up and running in no time!

BY DAN **AMRICH**

WHAT YOU NEED

- **TWO PCs**
- **HEADSET WITH MICROPHONE**
- **SKYPE**
  Free, www.skype.com
- **AUDACITY**
  Free, http://audacity.sourceforge.net/
- **LAME MP3 ENCODER DLL**
  Free, http://www-users.york.ac.uk/~raa110/audacity/lame.html
- **ITUNES**
  Free, http://www.itunes.com
- **ONLINE STORAGE AND A WEB HOST**

1 Get a Microphone

If you're an online gamer or you're into VoIP chatting, you've probably already got a headset with a microphone suitable for podcasting. If not, Logitech's Internet Chat headset ($25 list, but usually more like $15 retail, **www.logitech.com**) offers stereo sound, a flexible boom microphone, and is comfortable to wear for an hour or more.

For podcasting, any headset will work, but a quality mic will definitely yield better results.

2 Plan Your Show

The best podcasts are well organized and laser focused. You need to know what you want to say and how you plan to say it before you ask everyone to listen. Whether it's a weekly fan discussion about your local sports team, a Q&A session on your personal topic of expertise, or complete Pig Latin lessons for illingway udentsstay, your broad topic will define your potential audience.

Once you know what you plan to give them on a macro scale, it's time to get micro, so what you deliver will be organized, entertaining, and useful. Will you be hosting solo or do you plan to invite friends in as co-hosts and guests? And if so, what will they do? How long do you want each installment to last? How frequently will you update with new episodes? Write down ordered notes on the topics you want to cover in each show; regular segments such as trivia contests or opinion polls help lend structure while giving listeners a chance to get involved. (Now is a good time to set up an email address for podcast feedback, too.) All the other steps that follow are technical, but because this one is conceptual, it might take longer. It's worth the effort.

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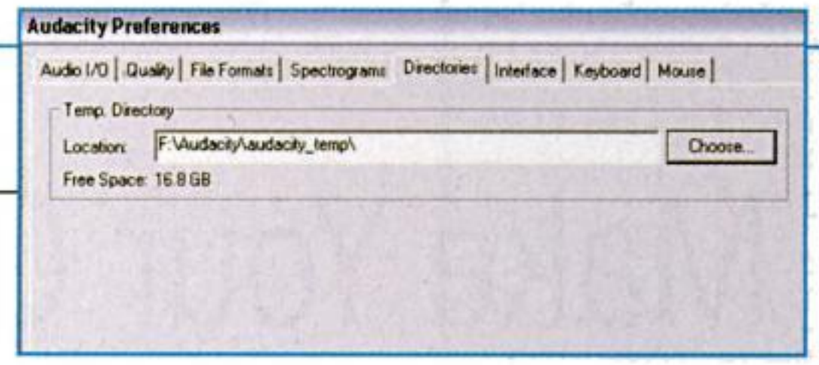
3 Prepare for Recording


Audacity Preferences
Audio I/O | Quality | File Formats | Spectrograms | Directories | Interface | Keyboard | Mouse
Temp. Directory
Location: F:\Audacity\audacity_temp\
Choose...
Free Space: 16.8 GB

Make sure you have at least 500MB of free storage space on the hard drive you'll record to.

The less background noise during your podcast, the better. Shut the door, shut the window, and shut down all the fan-cooled extraneous hardware you can. If you're using a headset, position the mic between the middle of your mouth and your bottom lip to minimize breathing noises.

You'll use one PC to host a Skype conversation with all the participants on your show. You'll use the other PC to record the audio output from the first PC. Connect the green line-out (also known as the speaker jack) of the Skype PC to the line-in or aux-in (not the pink microphone input!) of the other PC using the 1/8-inch audio cable. This is more for system resource reasons than anything—recording on the same machine that you use to host the Skype chat is possible, but usually not worth the echo problems or the risk if your machine crashes. Besides, you're a *Maximum PC* reader—we've gotta believe you can put your hands on a second machine for an hour or two a week.

On the recording PC, make sure *Audacity* is installed and has enough space for its temporary files. Go to Edit/Preferences and check the Directories tab. As long as the drive you're using has a few free gigs, you should be OK.

4 Record Your Show

If your PC is outfitted with a 7,200rpm hard drive or better, you should be able to record 44,100Hz, 16-bit audio files with no problem. It's always better to start with a high-quality recording and then compress it later. *Audacity* will default to a 44.1kHz mono recording, and unless your show needs to be in stereo, there's no reason to change it.

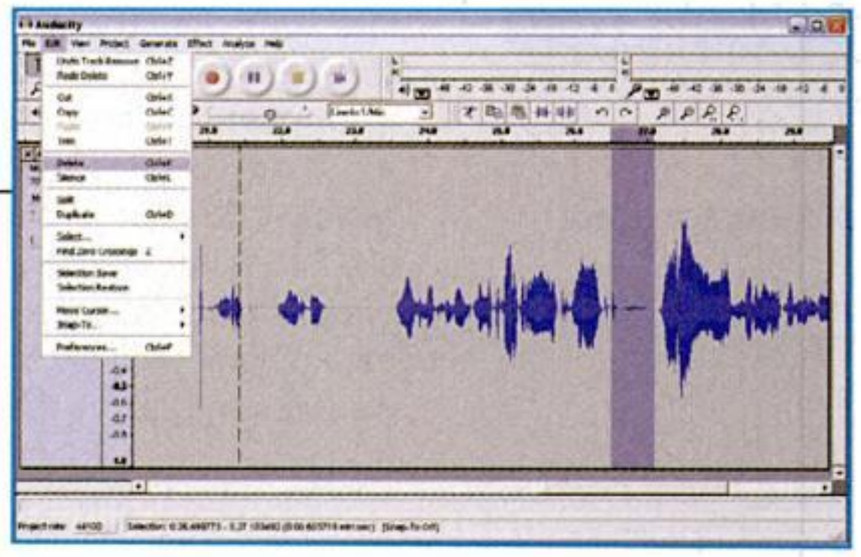
Fire up your Skype PC, plug in your headset and microphone, and invite everyone to join your Skype session. When everybody's joined and you're ready to record, turn to the second PC, set its audio input to Line In (you'll find it in the Control Panel for Sounds and Audio Devices) and open *Audacity*. Make sure that *Audacity* is set to record from the line-in input as well: Go to Edit, then Preference, and set the Recording Device correctly.

Audacity works like any other recording device—to record, just press the large red circle button at the top of the window. As long as you've connected your PCs correctly and selected the proper input, you should be underway. Your second PC is now recording the sound that comes out of the first.

Watch your levels during recording. *Audacity's* level meters are red bars in the upper right corner. If those bars are fully red more often than not, lower the Line In level on your recording PC—the incoming signal is probably too loud and distorting the recording. If you make a mistake that you want to edit out later, just take a breath and restart your sentence—that will give you enough time to remove the gaffe in the editing phase.

You should also keep an eye on the clock. The best podcasts rarely exceed an hour. People are (hopefully) going to listen to whatever you're saying, so you don't want them dozing off.

5 Edit Your Show



Tighten your show's flow by removing awkward pauses and snipping out mistakes and boring bits.

Save your project in *Audacity*. Export the entire unedited session as a WAV for backup purposes—click File, select Export as WAV, and choose a logical filename and a nice safe place for it to live on your hard drive.

Now you're ready to start hacking and slashing. In most cases, the main edits you'll need to do are removing awkward pauses, coughs, or retakes. To remove a section, press Ctrl + 1 to zoom into your audio stream, then highlight the section of the recording that you want to remove. Hit the space bar to listen to the highlighted portion; if you've only selected bits that you want to remove, tap the Delete key. Make sure you don't cut too close to the content you want to keep; some silence sounds natural, especially when people stop to breathe while talking.

For the sake of organization while editing, you should make each segment of the show its own track. Click the Project menu and select New Audio Track, then just cut and paste a segment from your Skype conversation into the new track. This way, you'll be able to see each segment at a glance and, better still, you'll have complete freedom to move them around easily.

A little music at the beginning and end of a show and between segments helps give your podcast personality. Good ol' U.S. copyright law makes podcasting your favorite CDs and MP3s a legal sticky wicket; it's better to use public domain material (just search Google for "public domain music"—and remember, all those military marching bands are your tax dollars at work!) or have a musician pal or local band whip up something original for you. Drag and drop the WAV or MP3 of your newfound, totally legal music into *Audacity's* project window and it will create a new track below your main track. (You'll find that it's probably stereo; that's fine.) Choose the Time Shift Tool (the double-pointed horizontal arrow icon in the bottom center of the icons in the upper left corner of the window—phew!) to grab your music and slide it where you want it to appear in the program. Click the Selection Tool (the upper left, vertical pipe icon in the same area) if you need to edit some more.

Play through your final podcast and make sure it sounds the way you want it to, because you're already ready to release it for your adoring fans.

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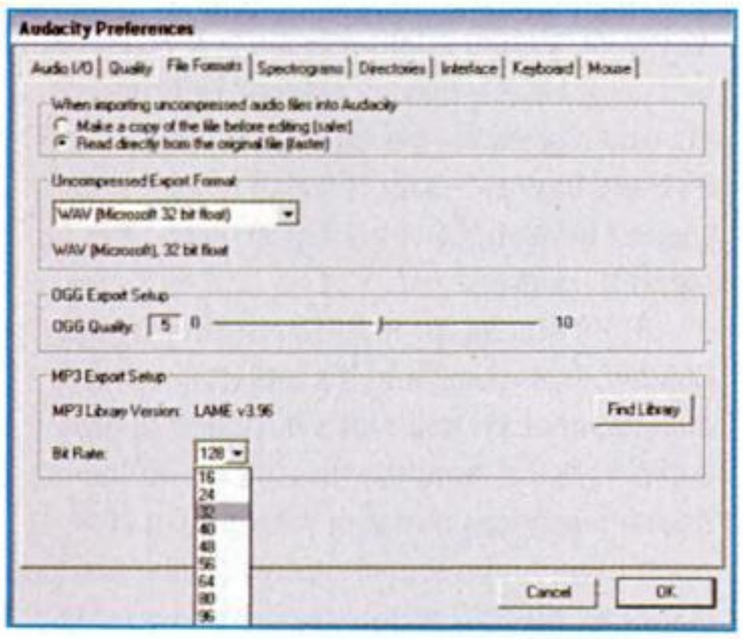
6 Encode to MP3

Audacity and the LAME MP3 encoder make a great open-source pair. Just show the former where you've saved the latter on your hard drive from within the Edit/Preferences/File Formats menu (click the Find Library button) and you can export your show directly to MP3 from *Audacity*. Because your podcast is mostly just recordings of people talking, it doesn't need to be CD-quality; a 64Kb/s bitrate is perfectly sufficient. If you're tight on bandwidth from your web host, 32Kb/s will do in a pinch. Keep in mind that higher bitrates generate bigger files, which in turn need more bandwidth... and you pay for bandwidth. Once you've chosen your bitrate, simply choose Export to MP3 from the File menu.



A bitrate of 64Kb/s is all you'll need for most podcasts; you can go lower if you need to save bandwidth.

7 Publish to the Web and Configure RSS Feed

Time to go public! If you're already running a website, simply carve out a little space on your server and upload your podcast MP3s into a publicly accessible directory.

The bit that makes your MP3 file into a legitimate podcast is a specially configured RSS feed, which includes a small chunk of XML code. The XML file contains the information (name, running time, size, etc.) about your podcast and the RSS feed announces its existence, so people can automatically download your latest episodes. Luckily, you don't have to know RSS or XML code—there are shortcut tools that take care of that stuff for you.

Many people host their podcasts within blogs, and there are free plugins to automate the RSS distribution. If you use the *Wordpress* suite for blogging (**http://wordpress.org**), go with the PodPress plugin (**www.mightyseek.com/podpress/**). If you're more of a *Movable Type* person (**www.sixapart.com/movabletype/**), then MT-Enclosures (**http://brandon.fuller.name/archives/hacks/mtenclosures/**) will do what you want. And if you don't want to launch a blog but prefer just throwing your podcasts on some spare web space, Mfeeds.com will generate all the required RSS/XML stuff for you.

If you don't have a web host or simply want your podcast to be independent of your other online presence, check out Libsyn.com for full-service hosting, including RSS/XML tagging. Libsyn sets its fees by storage space, not bandwidth. In other words, if your show winds up being insanely popular, you won't get hit in the wallet. Libsyn charges $10 a month to host a weekly, hour-long show with a mix of talk and music; if you have something bigger or smaller in mind, check the website for other prices.

8 Get Your Podcast on iTunes

Since podcasting gets its name from Apple's iPod, it's no surprise that Apple has embraced the self-published-audio movement fully within *iTunes*. To submit your podcast to *iTunes'* directory, simply select Music Store from the options on the left side of the main *iTunes* window, then select Submit a Podcast from the Inside the Music Store menu. Paste the URL of your podcast's RSS feed into the box and follow the prompts from there. MPC

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TigerDirect.com
CALL
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Please Visit
www.tigerdirect.com/logitech

Input Devices

G15 Gaming Keyboard
The Logitech G15 keyboard offers gamers an unprecedented level of in-game information, programmability and control.
L23-7074 G15 Gaming Keyboard $69.99

Logitech

G7 Laser Cordless Mouse
The Logitech G7 Cordless Mouse delivers extreme cordless performance with a 2000 dpi laser engine for blinding speed and precision response. The programmable tilt wheel adds an unprecedented level of control and gaming power.
L23-7054 G7 Laser Cordless Mouse . . . $74.99

Logitech

G5 Laser Mouse (Corded)
Adjust the weight and balance to win your game! The Logitech G5 Laser Mouse gives you the edge with a 2000 dpi laser engine sending out an astounding 500 USB reports per second for precision response at blinding speeds. A Logitech exclusive, the G5's 36-gram adjustable weight cartridge gives you thousands of variations on balance and weight—including one that's perfect for your unique gaming style.
L23-7046 G5 Laser Mouse (Corded) . . . $54.99

Logitech

MX Revolution Cordless Laser Mouse
The world's most advanced mouse, MX Revolution gives you powerful new controls that streamline the way you work. In fact, this amazing mouse provides an incredible 420 components to give you more options than ever before. Use the nearly frictionless alloy scroll wheel to fly through long documents at hyperspeed, or switch to precision click-to-click scrolling for navigating lists, slides, and image collections.
L23-7200 VX Revolution Laser Mouse $99.99

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Ask the Doctor

Diagnosing and curing your PC problems

POOPING OUT PRIOR TO POST

I've been having problems booting my system. I hit the power button and the system starts up, but it frequently shuts down even before it gets to POST (my hard drives barely get a chance to spin up). It will finally start up after several attempts, but this is frustrating and I'm worried that it eventually won't start at all. I've double-checked all my connectors, and I even upgraded my 420-watt power supply to a 620-watt model. All that did was reduce the frequency at which this problem recurs. Any suggestions?

—Daniel L. Doctor

The doctor's usual diagnosis for a system that boots but shuts down before POST is an overheating CPU. That doesn't seem to be the case here, because your system does start up—eventually. And because you've already upgraded your power supply, you've eliminated that component from the list of suspects. The next thing to check for is an electrical short. Strip your system to its essential components: videocard, hard drive, monitor, and keyboard. If it repeatedly starts up successfully, add components—mouse, optical drive, soundcard, and so on—until it fails: Whatever you added last is the culprit. If you experience start-up problems in a bare-bones configuration, you'll likely need to replace the motherboard.

CYBER CANNON FODDER

*I'm tired of being owned in multiplayer bouts of **Call of Duty 2** before I can even draw a bead on my opponents. Can you suggest which upgrades I should make to my admittedly lacking system? I run a custom Foxconn KT600-8237 motherboard with an AMD 1.8GHz Athlon XP, 384MB of RAM, and an Nvidia GeForce 4 MX 4000. I've installed the most current **CoD2** patch, and I access the Internet with a 3Mb/s-down and 386Kb/s-up DSL connection. My ping time is 103ms. Does the problem lie with me, my system, or my Internet connection? Or are the other guys beating me by using cheats or exploits? I know I provide hours of entertainment for them, but this is getting old quick.*

—David Turman

To echo Lance Armstrong's philosophy: It's not about the bike (or the computer, in this case). On the other hand, a sucky GeForce 4 MX in a system outfitted with a 1.8GHz Athlon XP and just 384MB of RAM is way off the power band for running *Call of Duty 2*. Since you can't migrate 90 percent of your components to a new system, it's time to consider a complete rebuild or buying a new pre-built rig. If you can't swing that, the Doc recommends concentrating your upgrade options on a new videocard. An ATI Radeon X1600 Pro will cost between $100 and $120. An AGP card based on Nvidia's GeForce 7800 GS would be a much stronger contender, but one of those will set you back more than twice that. Do you really want to sink that much green in a videocard you can't take with you when you migrate to PCI Express?

HDCP + (DVI/HDMI) = DRM X BS

*I've been researching new computers for my son for Christmas, and I'm in a bit of a quandary when it comes to selecting the right videocard. The system will be primarily for school work; however, he'd also like to use it for playing the newest games. Several recent issues of **Maximum PC** have stated that in order to watch upcoming HD movies, both the videocard and the monitor must be HDCP compliant. Nearly all the videocards I've seen have indicated HDTV compatibility; does this mean they're HDCP compatible, too? One of the cards I'm considering is XFX's GeForce 7900 GT (model PV-T71G-UDF7); does this card support HDCP?*

—Robert Miller

Mad skills can't make up for antique hardware. Playing a game from 2006, such as *Call of Duty 2*, on a videocard from 2002 is just not going to be much fun.

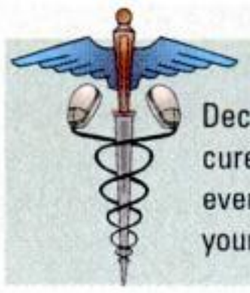
Your confusion is understandable, because the videocard industry has been purposely obtuse in its discussions of HDCP until very recently. Nearly all modern videocards support HDTV, but that compatibility doesn't universally extend to the new high-definition video disc formats—HD-DVD and Blu-ray—both of which require HDCP support through the entire digital chain (disc to player to display).

HDCP stands for High-Bandwidth Digital Content Protection, and it's a digital rights management system that's designed to protect Hollywood from the (overblown, in the Doctor's opinion) threat of piracy. As a computer user, you're impacted only if you want to install an HD-DVD or Blu-ray drive in your PC and use it to watch Hollywood movies in those formats. DVD drives and DVD movies don't use this type of DRM.

If you do want to play high-def movies on your PC and output them to a digital display via a DVI or HDMI cable, you'll need both a videocard and a digital display that support HDCP. The list of videocards—as well as the list of digital displays designed for use with PCs—that support HDCP is fairly small, but will grow over time. Nearly all HDTV sets manufactured in the last few years, on the other hand, already support HDCP.

There is a work-around: If you output the video from an HD-DVD or Blu-ray disc from your videocard in analog format, via either VGA or component video (Y, Yb, Yr) cables, neither your videocard nor your display needs to support HDCP.

As for the specific XFX card you mention, it is one of many that does not support HDCP. MSI's model-number NX7900GT-VT2D256E HD, on the other hand, is based on the very same video processor and it does. You might also want to look at cards based on the brand-new GeForce 7950 GT. As the Doc understands, all cards based on this chip will support HDCP. MPC



Deck the halls with boughs of Cat5e! 'Tis the season for the Doctor to cure PC problems! Actually, that's what he does all year long; in any event, email your holiday greeting cards—and detailed descriptions of your most bah-humbug tech tribulations—to **doctor@maximumpc.com.**

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White Paper: Speaker Technology Basics

Speakers are fairly simple devices with the singular task of pushing air to produce sound waves.

BY BILL **O'BRIEN**

The typical speaker is easy to describe, at least in its most simple form: It begins life as a metal frame—typically fabricated from aluminum—that looks something like a fruit basket. A permanent magnet is mounted to the narrow end of the basket; a coil of wire is suspended in the middle of the magnet on a circular, pleated hammock called a "spider" (so called because of the web-like design used in early speakers); and a circular sheet of paper is attached to the coil at one end and to the large opening of the metal basket at the other, forming a cone.

GOOD VIBRATIONS

Obtaining sound from this collection of parts isn't rocket science; in fact, it's physics. You apply a current to the coil, turning it into an electromagnet. Depending on the polarity of that current, the coil is either repulsed from or attracted to the permanent magnet. Because the cone is attached to the coil, it moves along with the coil, and the air on either side of the cone moves along with it. Sound, of course, is what our brains perceive from the movement of air as it ruffles the tiny hairs on the cochleae inside our ears.

But there's a world of difference between the song of a bird, the rumble of an engine, and cannons being fired in the midst of the *1812 Overture*. Each of these sounds occurs at a specific frequency, measured in Hertz (1Hz equals one cycle per second), and human ears can detect sound within a range of 20- to 20,000Hz.

Because the coil actuates the cone, the key to having the speaker produce a specific number of cycles per second is to have the coil (and thus, the cone) vibrate at the desired rate. This is accomplished by changing the polarity of the current flowing through the coil. Changing the polarity 20 times per second, for example, will vibrate the coil—and the attached cone—at 20Hz to produce a very low sound. Bumping that to 20,000 times per second will create sound at the upper limit of human hearing.

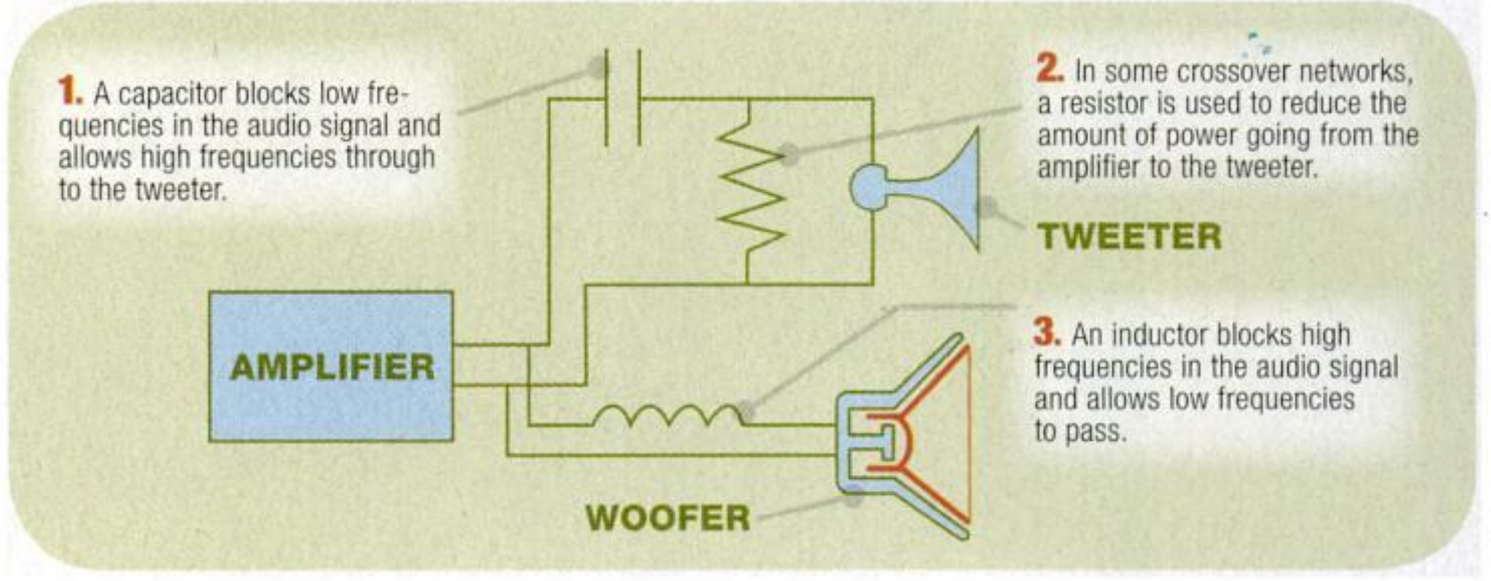
A JOYFUL NOISE

While it's the audio circuitry that's responsible for modulating the speaker correctly to produce the right sounds, speaker manufacturers have a few tricks up their sleeves to enhance sound quality. They realized early on that they could achieve better cone mobility, which results in better audio response, by placing a collar of soft material—typically urethane, butyl rubber, or polyester foam—between the edge of the cone and the edge of the frame (technically known as the surround).

They also quickly realized that size matters: Large cones (now commonly known as woofers) proved most capable of producing low (long-wavelength, slow-moving) frequencies, while small cones (referred to as tweeters) were best at producing high (short-wavelength, fast-moving) frequencies. And it didn't take long to come up with the idea of using a third speaker to handle midrange frequencies. A crossover network filters the incoming signal to route high frequencies to the tweeter, low frequencies to the woofer, and in-between frequencies to the midrange.

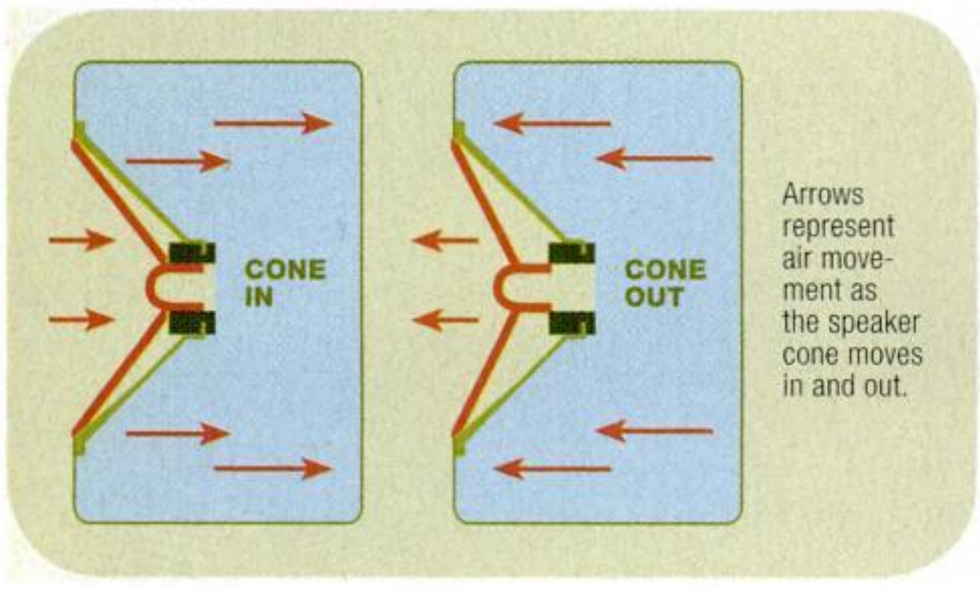
Paper, or a doped/treated variety thereof, has long been the favored cone material because it's light and stiff. Rigidity is important to keep the cones from moving—and thus producing sound—after the coil stops moving; these secondary vibrations introduce distortion. Speaker manufacturers have gone down many other research-and-development paths—out of necessity and in search of improved performance: Paper-cone speakers didn't fare well in automobile installations, for example, because they're exposed to temperature extremes. Polypropylene was soon introduced as a more viable substitute because it's reasonably rigid, exhibits good internal damping characteristics, and offers great weather resistance.

HOW IT WORKS **A two-way crossover network**


1. A capacitor blocks low frequencies in the audio signal and allows high frequencies through to the tweeter.
2. In some crossover networks, a resistor is used to reduce the amount of power going from the amplifier to the tweeter.
TWEETER
AMPLIFIER
3. An inductor blocks high frequencies in the audio signal and allows low frequencies to pass.
WOOFER

A two-way crossover network filters the incoming signal to route high frequencies to the tweeter and low frequencies to the woofer. In a three-way speaker system, in-between frequencies are piped to a midrange driver. Speaker designers will often place a resistor in the signal path going to the tweeter, to reduce the amount of power that reaches it from the amplifier.

HOW IT WORKS **A sealed enclosure**



In this cross-section of a sealed speaker enclosure, we can see how the speaker cone compresses air inside the enclosure when it moves in, and rarefies the air when it moves out.

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Satellite Speaker

Some products survive autopsy to serve another day; some don't. This Creative Labs speaker was sealed up so tight we had to "disassemble" it with a hacksaw.

Many manufacturers build woofer cones using the artificial fiber Aramid—more commonly known by its commercial name, Kevlar—because, or so the claim goes, its fibers are much stronger than those in cellulose. Kaladex—a type of polyester—produces natural-sounding highs in tweeters. And silk (if you can afford it) or silk/polymer composites (if you can't), is a sought-after substance for tweeters. Other popular materials—valued for their strength and the fact that they don't color the sound—include titanium, mica, ceramic, and even nickel.

THE BOXER

The design and construction of a speaker's most passive element—its enclosure—is equally as important as the magnet, paper, and metal used in its active components.

Plastic is often used for speaker cabinets because the material is inexpensive and easy to manipulate. But plastic tends to resonate—subtly contributing audio frequencies not present in the source material—so up-market speakers are nearly always constructed from medium-density fiberboard (MDF). The uniformity of this building material helps prevent vibration and undesired tone color.

Many PC speaker systems use sealed enclosures to help reduce secondary vibrations from the speaker cone. When the cone moves in, it compresses air inside the cabinet; when the cone moves out, it rarefies the air. Because the air will always move to equalize the pressure level inside and outside the cabinet, this design helps return the cone to its neutral position.

In a bass-reflex design, inward air pressure is directed out of the enclosure through a small port, producing a second sound wave in the process. But because no air pressure builds up inside the enclosure, it can't be used to return the cone to its resting position. A poorly designed bass-reflex system, therefore, won't sound as precise; but it will be more efficient (and thus louder), because the amplifier doesn't need to overcome that back pressure. Passive radiator designs are very similar to bass-reflex systems, except that the backward air pressure drives a second, non-powered speaker inside the cabinet.

As with most products, technology and lower labor costs—just try to find a low- to midrange speaker system *not* manufactured in China—have combined to render quality speakers amazingly affordable. But you can cut only so many corners before you encounter irreparable sonic compromises: Higher price tags typically translate into better-quality speakers—at least until the law of diminishing returns sets in. MPC

CABINET This shell is fabricated from thick, high-impact plastic to minimize unwanted resonance. Higher-end speaker cabinets are made from medium-density fiberboard, which is more effective—but more expensive—than plastic.

TWEETER The tweeter is designed to produce high frequencies. The diaphragm in this one is manufactured from titanium, a metal alloy valued for its strength and light weight.

CAPACITOR In a crossover network, a capacitor acts as a filter to block low frequencies in the audio signal and allow high frequencies through to the tweeter.

MIDRANGE This speaker is part of a 5.1-channel speaker system, so bass frequencies are handled by a separate subwoofer. If the system didn't have a sub, this speaker would be considered a woofer. This one is fabricated from polypropylene, a fairly rigid material that provides good damping and is resistant to humidity. A strip of butyl rubber surrounds the cone and attaches it to the metal basket.

PERMANENT MAGNET The speaker's permanent magnet works in conjunction with the electromagnet produced by the speaker coil to move the speaker cone back and forth—as the electromagnet changes polarity—to produce sound. The permanent magnet in this speaker, hidden inside a steel enclosure, is manufactured from ferrite particles.

MAGNET SHIELD A magnetic field can wreak havoc on video monitors, so it's imperative that you have a shielded magnet in any speaker that's going to be in proximity to your display. Magnetic shields are frequently made of alloys with a high percentage of nickel.

INDUCTOR This component is also part of the crossover network, but inductors perform the opposite action of capacitors: They filter out high frequencies in the audio signal and allow low frequencies to pass through to the woofer or, in this case, the midrange driver.

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GORDON **MAH UNG**

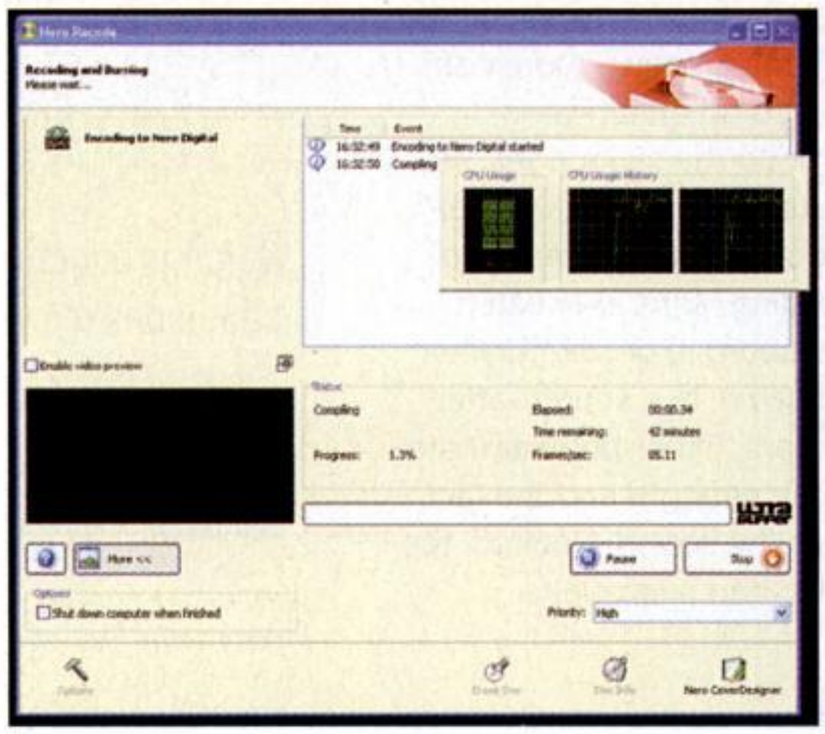
Recycles Recode

And does some benchmark house cleaning

Since revamping our system benchmarks in June, I've been hoping for something a little more modern and punishing to replace our *Nero Recode 2* test, which we use to convert ripped VOB files into Sony PSP-compatible MPEG-4 videos. *Recode 2* is multithreaded and does a fine job of encoding, but I'm just not sure how many people are watching movies on their PSP anymore. Apple's fifth-gen iPod far outsells the PSP, and the demand for video is popular enough that Apple has signed a deal to sell movies through its iTunes service.

I originally passed on encoding video for the iPod with *Recode 2* because *Nero's* H.264/AVC encoder wasn't multithreaded. Using a non-multithreaded encoder with dual-core CPUs is just stupid. With the *Nero 7.5* update, *Recode 2* finally gets multithreading for H.264, so starting next month we'll benchmark review systems using the new encoder, making the results more relevant for iPod users.

Just how do current systems stack up? I tested a few of the machines we have running in our Lab, and the Core 2 Extreme X6800 continues to be top dog. The Core 2 Duo E6600 runs about 10 percent slower—not a bad showing considering that its clock speeds are about 22 percent slower. Our FX-60/SLI zero-point system and the X2 5000+ ran about the same—16 percent slower than the Core 2 Extreme—which shows that the encoder isn't closely tied to L2 cache size. For kicks, I also tested an old Pentium Extreme Edition 840 machine. The original 3.2GHz Smithfield just hasn't aged well, taking twice as long to encode our sample video as the Core 2 Extreme.



***Nero 7.5* includes an updated multithreaded H.264 encoder for *Recode 2*.**

Our current benchmark suite also includes *FEAR* using the 1.03 patch. We'll be updating it to the 1.07 retail patch and re-running it with the current driver for our GeForce 7900 GTX cards starting next month.

I don't anticipate any more major benchmark changes until Microsoft Vista arrives next year. Because the new OS will probably break already fragile *SYSmark2004 SE*, we'll probably have to drop that benchmark until BAPCo releases an update for the new OS.

BENCHMARKS

	ENCODE TIME (MIN:SEC)	% DIFFERENCE FROM FASTEST CPU
2.93GHZ CORE 2 EXTREME X6800	33:46	
DELL XPS 700 2.93GHZ CORE 2 EXTREME	36:09	-5.7%
2.4GHZ CORE 2 DUO E6600	40:09	-10.0%
2.6GHZ ATHLON 64 FX-60	43:06	-16.1%
2.6GHZ ATHLON 64 X2 5000+	43:27	-16.8%
3.2GHZ PENTIUM EXTREME EDITION 840	58:18	-41.5%

All machine except for the Pentium Extreme Edition used a WD 400GB SATA drive and 2GB of RAM. The PEE840 used a Maxtor 300GB drive and 3GB of RAM.

Will Smith

Tests the Bigfoot NIC

Developing fair, repeatable tests is trickier than it sounds

Developing new benchmarks can be a frustra- ing, time-consuming process, fraught with missteps and dead ends. Figuring out exactly how to test the new Bigfoot Killer network card (reviewed on page 70) was one of the stickiest wickets I've encountered during my time at *Maximum PC.*

The problem lies in isolating variables. Because our testing had to happen online, a couple of the main variables—our network connection and server performance—were completely out of our control. Furthermore, standard timedemo-style benchmarks wouldn't provide meaningful information. Instead we had to test using *Fraps* to capture the frame rate when we were in game, which made it even more difficult to get repeatable results.

I ended up building clean installs of Windows on two of our identically configured test beds (a pair of Athlon FX-60 rigs, each with 2GB of RAM on an nForce4-powered Asus A8N32-SLI Deluxe motherboard). Then, I tested using *FEAR: Combat* ver. 1.07 and *Counter-Strike: Source* on Internet game servers, both populated and empty. On unpopulated servers, testing was a cinch. By carefully positioning the character and crosshairs, we were able to align the two computers and measure frame rate and ping. I repeated the test several times on different servers, and reported the average difference between the two platforms' frame rate and ping. These are the results listed in the benchmark chart in the review.

Testing was a little trickier on populated servers—we moved both characters to the same position in the map, then ran side-by-side down a disused hallway, recording frame rate using *Fraps*. This test was less repeatable, so we didn't report these results, but they did paint a picture that backed up our other test results.

If you want to see how the Killer performed, turn the page.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC,* our mantra for testing has always been "real world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six benchmarks we use to test every system we review.

SYSmark2004 SE: This is an update of the *SYSmark2004* benchmark, which uses a suite of such common applications as Microsoft *Word, Excel, PowerPoint*, Macromedia *Dreamweaver*, *Flash,* and *Winzip* to test general performance. It isn't heavy in multithreading, but it does feature multitasking tests.

Adobe Premiere Pro 2.0: We finally ditched our old standard-def *Premiere* test for one that uses high-def source material. The test is multithreaded, uses the GPU for transitions, and is brutal. It takes about an hour on our zero-point to render a short two minute, 46 second benchmark movie in the program.

Adobe Photoshop CS2: We start with a RAW photo shot with a Canon EOS 20D, and apply a crapload of filters and other tasks from *CS2* to see just how fast a rig can chew through the workload. Because we use every filter we can, the test is more fair and balanced than the usual cherry picking of *Photoshop* tests.

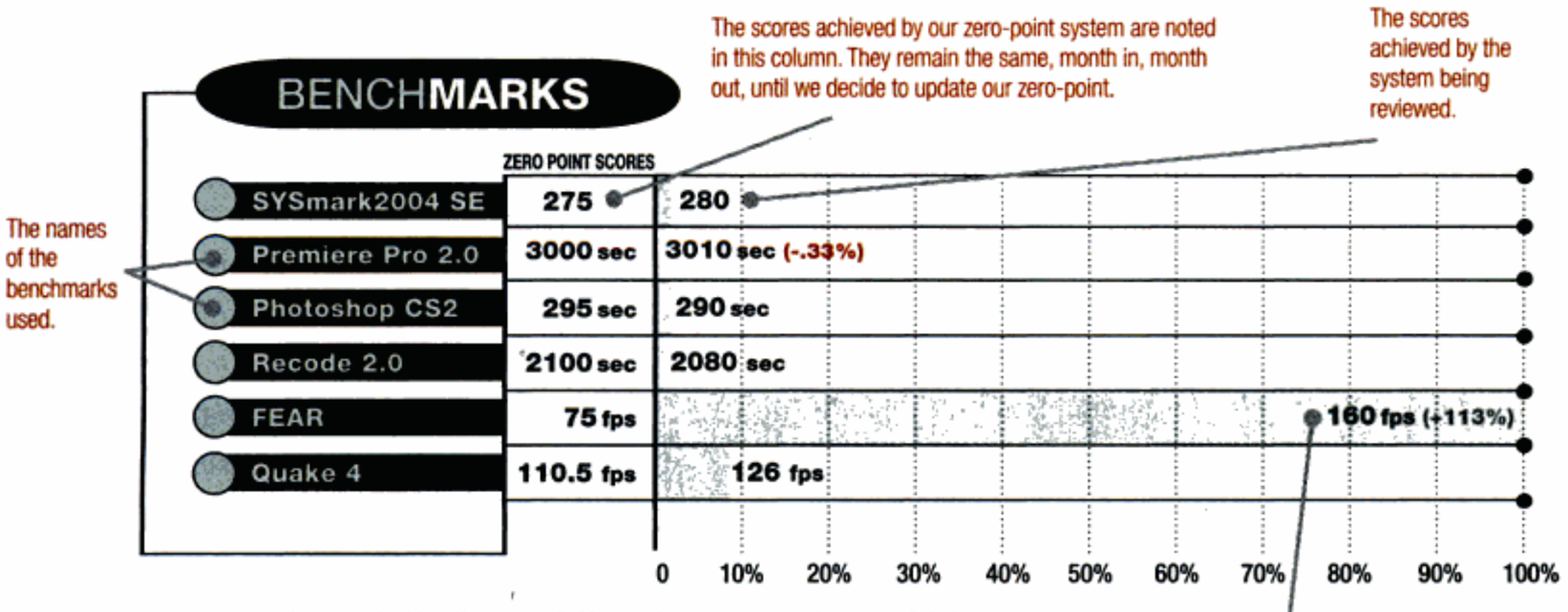
Ahead Nero Recode 2.0: *Nero Recode 2.0* is one of the fastest video-transcoding utilities. We copy unencrypted VOB files to the hard drive, then convert the movie to the Sony PSP's MPEG-4-based format. The program is heavily multithreaded, and shows marked performance increases on dual-core machines.

Quake 4: Based on the *Doom 3* engine, *Quake 4* is a popular OpenGL game. We run our test at 1600x1200 with 4x antialiasing and 4x anisotropic filtering. Generally, more robust OpenGL drivers yield better performance. We use a custom timedemo recorded using the 1.2 patch, which supports Hyper-Threading and dual-core processors.

FEAR: Monolith's *FEAR* is a cutting-edge DirectX game that pushes graphics hardware and systems to the limit. We run *FEAR* at 1600x1200 with soft shadows, physics, and audio acceleration enabled, and using the 1.03 patch.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

Every month we remind readers of our key zero-point components.

Our monthly category-by-category list of our favorite products. New products are in red.

High-end videocards, dual-card config
XFX GeForce 7900 GTX (model PV-T71F-YDD9)

High-end videocard, single-card config
eVGA e-GeForce 7950 GX2

Midrange videocard:
Sapphire Radeon X1900 XT (256MB) *Mo' speed without mo' money!*

Soundcard:
Creative Labs X-Fi Xtreme Music

Hard drive:
Seagate Barracuda 750GB 7200.10

External backup drive:
Western Digital Dual-Option Media Center 320GB

Portable USB drive:
Maxtor One Touch III 100GB

DVD burner:
Plextor PX-716A

Widescreen LCD monitor:
Dell 2407FPW

Desktop LCD monitor:
NEC 90GX2

Socket AM2 Athlon 64 mobo:
Gigabyte GA-M59SLI-S5

Socket 775 Core 2 Duo mobo:
Asus P5W DH Deluxe

Portable MP3 player:
Apple iPod

5.1 speakers:
M-Audio Studiophile LX4 5.1 (LX4 2.1 with 5.1 Expander System)

2.1 speakers:
M-Audio Studiophile LX4 2.1

Mid-tower case:
ThermalTake Armor Jr.

Full-tower case:
Silverstone TJ07

Games we are playing:
Company of Heroes, Lego Star Wars II: The Original Trilogy, Tiger Woods 07, Medieval II: Total War, FEAR: Combat, Battlefield 2

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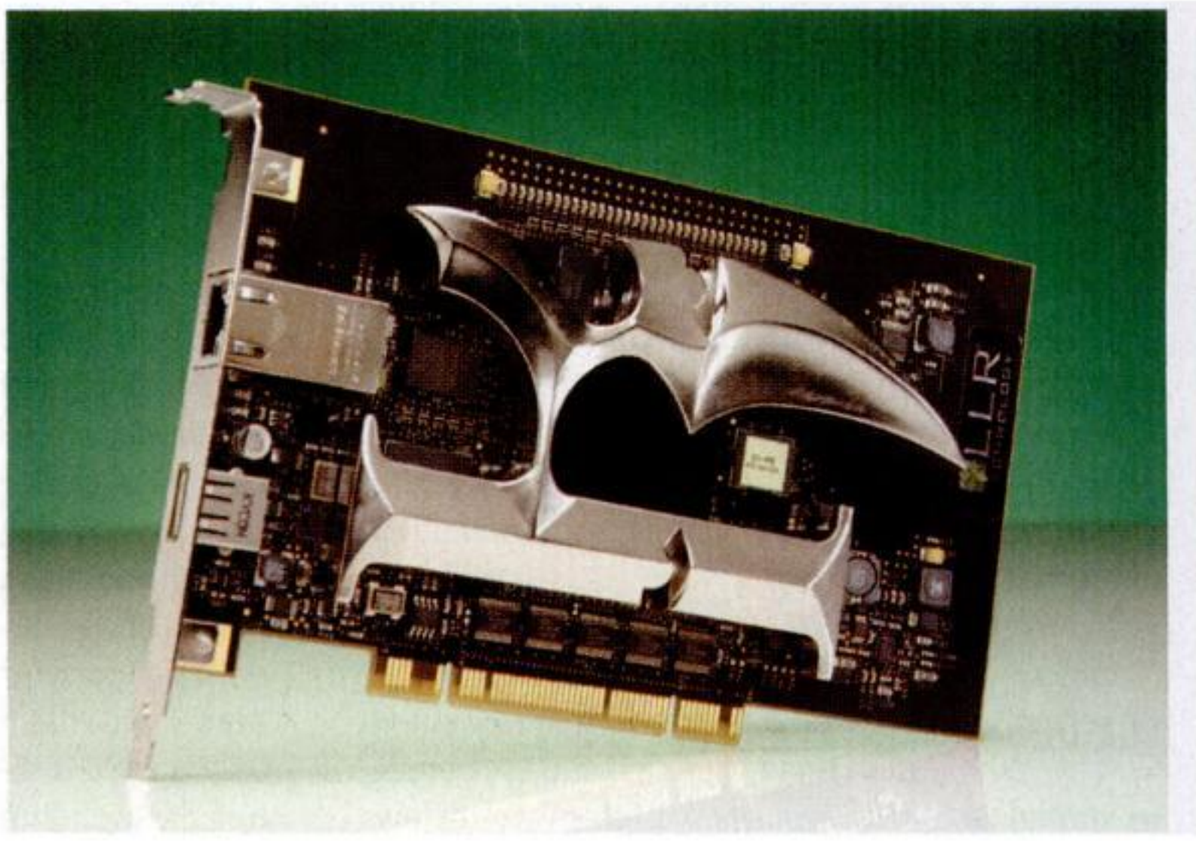
Bigfoot Killer NIC

Big promises, itsy-bitsy results



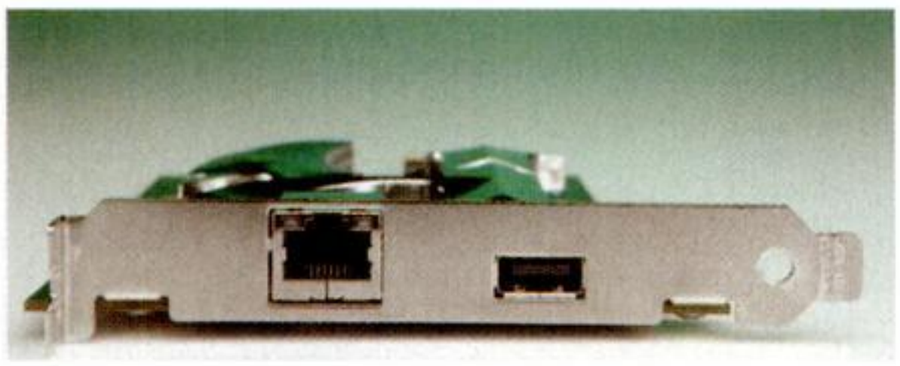
We admire the Killer NIC more for its Linux-running, 400MHz processor than its virtually imperceptible boost to performance.

Bigfoot's new Killer network card burst into the competitive gaming market by making two huge promises—it would reduce ping and increase frame rate. And while it does deliver on those claims, it doesn't deliver meaningful improvements that justify its exorbitant $280 price tag.

How does it work? Unlike most modern network cards—including the one that's built into your motherboard—the Killer includes its own dedicated processor. With a 400MHz proc running Linux to manage all the traffic into and out of your system, a Killer NIC should help lighten the load your CPU has to bear in games, right? And it does, but the performance gains are negligible, as the bottleneck in most gaming rigs lies not at the CPU, but at the videocard.

In our tests, we saw frame rate increases of between 3 and 10 percent when we compared a Killer-equipped machine with an otherwise-identical machine using the nForce Ethernet controller. (See page 68 for a full description of our testing procedure.) Unfortunately, that was only at low resolutions in a couple of games, where the CPU was more of a bottleneck than the GPU. At resolutions we actually play games at, the Killer delivered a more marginal boost.

What about claims of a greatly decreased ping? In addition to offloading networking duties from the CPU, the Killer provides an optimized networking stack that's actually more efficient than the one that ships with Windows. We saw a consistently lower ping on the Killer-equipped machine compared with the same configuration sans Killer card. The problem is that the ping was a mere 5ms lower on the Killer machine. We couldn't detect any appreciable difference between the two test machines in our play tests, save one exception. When we had a download running in the background, the ping on our Killer-equipped system showed virtually no negative impact. (Windows Vista is shipping with a rewritten networking stack next winter, which has shown significantly improved networking throughput in our informal testing.)



The Killer includes its own USB port, so the onboard CPU can interface directly with peripherals—such as a hard drive or microphone.

There's one other feature of dubious value: "Ping Control." Ping Control lets you increase your ping to even the playing field if you're battling whiny modem users in Tibet. That would make this the first $300 piece of PC hardware you'd buy to give the *other guy an advantage*. We say, "No thanks!"

We're also concerned about the possibilities the Killer opens for cheaters. The card essentially replaces the separate proxy machine that's necessary for most cheating schemes—and it's cheaper and easier to maintain.

Not all is bad with the Killer card, however. We're impressed with some of the nifty tricks you can use the card's integrated processor for. You can run CPU-hogging apps, such as *Teamspeak* or *Ventrilo*, on the board's 400MHz processor, within the Linux environment. We weren't able to test this because the board-native apps aren't available yet, but we'd expect to see a small performance boost in that scenario.

Still, the population that will most benefit from the Killer NIC are online gamers running older single-core rigs, where the CPU is straining to run a game and the network card at the same time. But even if you're running an older rig that could benefit, you need to ask yourself if you'd be better off applying the $280 purchase price of the card to your next system upgrade instead of a component crutch.

—WILL SMITH

SPECS

CPU	32-bit 400MHz Freescale
MEMORY	64MB PC2100 DDR
DATA RATES	10/100/1000 Ethernet

BENCHMARKS

	KILLER	NVIDIA
FEAR: COMBAT (FPS)	**405**	395
FEAR: COMBAT PING (MS)	**68**	72
COUNTER-STRIKE: SOURCE (FPS)	**158**	155
COUNTER-STRIKE: SOURCE PING (MS)	**55**	60

Best scores are bolded. For full testing details, see page 68.

BIGFOOT KILLER NIC

+ AZIRAPHALE

400MHz onboard processor; can run many Linux apps on the board.

– CROWLEY

Imperceptible ping reduction; very little performance gain.

6

$280, www.bigfootnetworks.com

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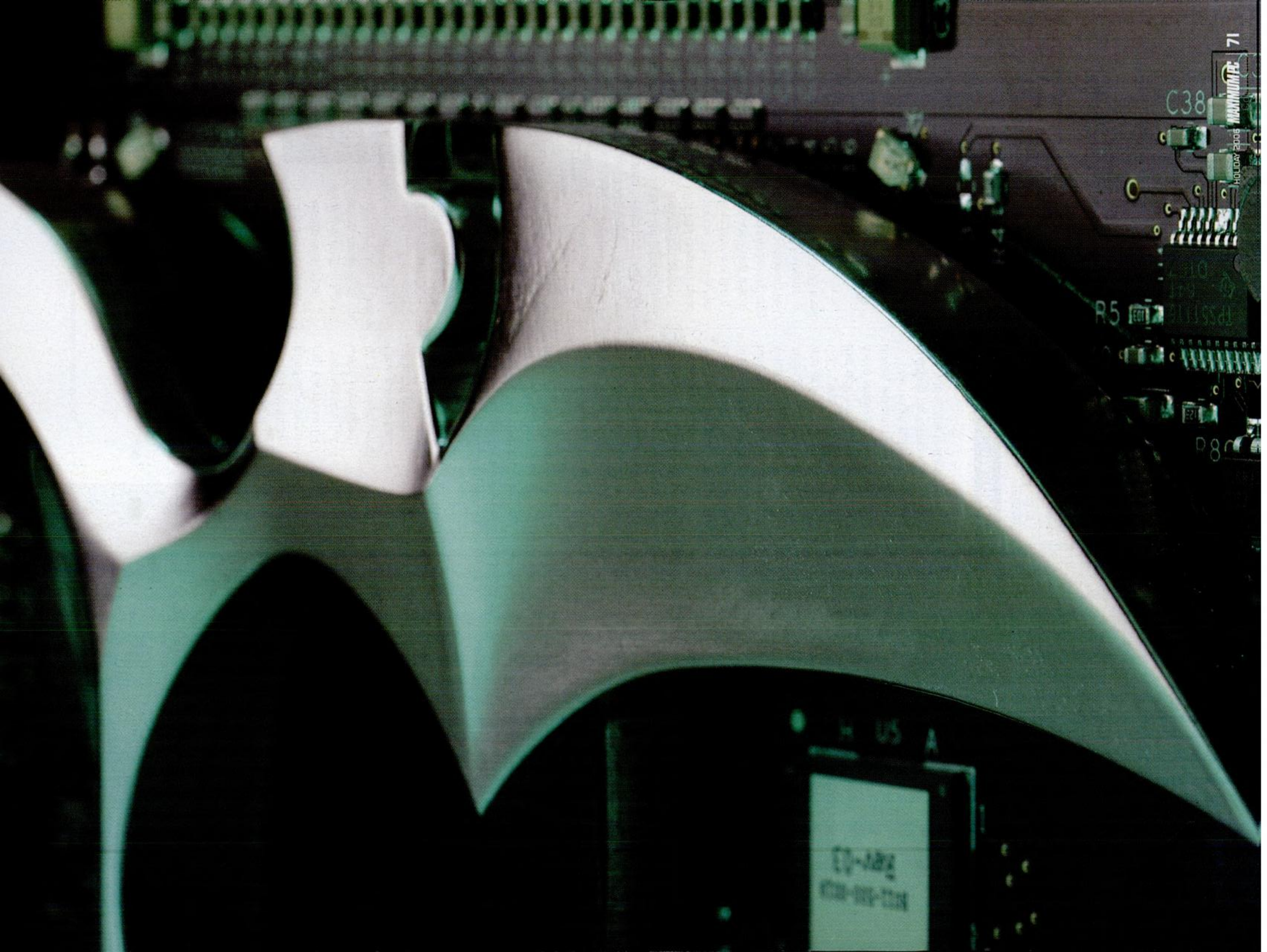

MAXIMUM PC
AWARD 2002
C38
R5

Dell XPS 700

It coulda been a contenda

The Dell XPS 700 is superbly built but inexplicably slow in application performance.

Dell PCs have long been technically proficient—they've dotted their SLIs and Crossed their Fires—but they've just never had the panache of their contemporaries.

In the past, you never would have confused an older XPS for a Voodoo PC, but the redesigned XPS 700 proves that Dell can build a sexy bastard. How sexy? This aluminum-skinned box even got cruised by editors from our sister magazine *MacAddict*, who commented that the XPS 700 looks nicer than the new Intel-based Macs. Considering that Steve Jobs personally shows up at your home and beats you with a bar of soap in a pillow case if Believers speak ill of the Mac design, that's high praise.

Unfortunately, the XPS 700 doesn't have it where it counts: performance. That's a real heart breaker because this machine is like a glimpse of a PC from the future. Peep this: It has a BTX motherboard using Nvidia's nForce 590 SLI Intel Edition chipset, a 1-kilowatt PSU, quad SLI, Intel's delicious Core 2 Extreme X6800, dual Raptor drives plus a 500GB back up drive, an all-SATA optical drive setup, and a BIOS that's primed for future quad-core processing. We know, BTX is losing steam, but we're impressed by its performance here. Except for an initial *whoosh* when you power it up, the XPS 700 is as quiet as some water-cooled machines with lesser hardware configs, and we think the air-channel design of BTX is a big contributor to that.

The BTX wind tunnel in this PC keeps the acoustics to a minimum, even under a full load.

Dell's engineering team also gets credit for the heavy-duty brackets that hold the graphics cards in place. But we take umbrage with the decision to use a nonstandard power cable. Dell is likely trying to avoid any potential lawsuits that could arise if someone substitutes the PC's power cable for, say, the one that came with their inkjet printer and consequently causes a fire. But come on, there's got to be a better way, fellas.

But as we said, the really bad news is in performance. Although the XPS 700 decimates our Athlon 64 FX-60/SLI zero-point system, the iBuyPower system that we reviewed in the November issue was faster than the XPS 700 in apps. In *Premiere Pro 2.0*, the Dell was slower by 16 percent, and in *Photoshop CS2* it was slower by 6 percent. Considering that both machines use the same CPU, the same amount of RAM, and the same primary drives, we can't figure out why the XPS lags.

We might have made more sense of this puzzling performance predicament if we had gotten the finicky *SYSmark2004 SE* to run on the XPS, but the überbenchmark of application performance tends to *not* run more often than it does these days. It wasn't all bad news, though. The quad-SLI setup, which so vexed us in the November issue, is apparently working better. In fact, it helped the XPS 700 take two records for gaming.

What we have here is an opposite of last month's iBuyPower, which could compute the crap out of an *Excel* sheet but fell down in gaming. While the XPS 700 is certainly no slouch in applications, it's not as fast as it should be. It is, however, the record holder for the two games we use to judge system performance. But at what price? The app performance leaves us uneasy about this otherwise sterling PC.

—GORDON MAH UNG

UNDER THE HOOD

BRAINS	
CPU	Intel Core 2 Extreme X6800 (2.93GHz dual core)
MOBO	Custom Dell (nForce 590 SLI Intel Edition)
RAM	2GB Corsair (two 1GB sticks)
LAN	Dual Gigabit LAN (Nvidia)
HARD DRIVES	Two 150GB Raptors (10,000rpm SATA) in RAID 0, and one 500GB Seagate
OPTICAL	Philips DROM6316, TSST TS-H553A
BEAUTY	
VIDEOCARD	Two GeForce 7950 GX2s in quad mode (500MHz core/342MHz RAM)
SOUNDCARD	Sound Blaster X-Fi Xtreme Music
CASE	Dell Custom
BOOT: 45 sec.	**DOWN: 9 sec.**

DELL XPS 700

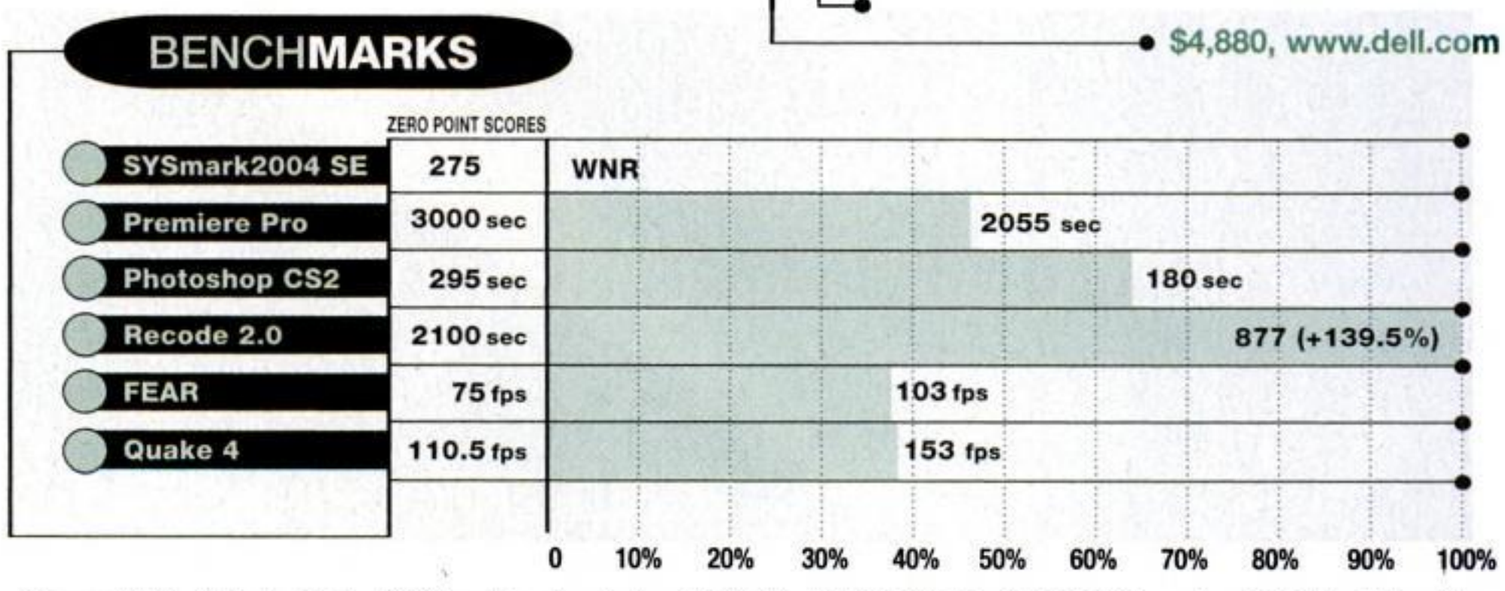
+ IRONMAN
This sexy, solid machine breaks gaming records.

− IRON CHEF
Slower than other X6800 PCs in applications. The proprietary power cable makes us sad.

7

$4,880, www.dell.com

BENCHMARKS



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

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EVGA e-GeForce 7950 GT KO

Fie, Fye, Ho, Hum

EVGA's design diverges slightly from Nvidia's 7950 GT reference to enable mild overclocking of the GPU and the card's 512MB GDDR3 memory.

The videocard market is becoming less and less interesting as the Direct3D 9.0 epoch draws to a close. Take the Nvidia GeForce 7950 GT GPU at the heart of this product: Aside from the fact that Nvidia expects all its add-in partners to implement HDCP, there's very little here that's new.

On the other hand, we find the ongoing competitive dance between Nvidia and ATI extremely entertaining: The high-end ATI X1950 XTX we reviewed in November came with a very fast GPU, 512MB of GDDR4 memory, HDCP support, and a quiet (finally!) cooling solution that consumed two slots. Having been first to espouse the importance of having 512MB frame buffers, we expected this design choice to proliferate throughout the company's product offerings. Instead, ATI also introduced a new flavor of the X1950 XT that has only half the memory of the original; yet the new card still consumes two expansion slots.

Retaining possession of the fastest single-slot videocard crown with its HDCP-enabled 7950 GX2, Nvidia answers ATI with this new midrange part—the 7950 GT—which is designed to sit on a single-slot card alongside 512MB of GDDR3 memory and an HDCP encryption ROM. The 7950 GT has the same number of pixel-shader units (24) and the same number of vertex-shader units (8) as Nvidia's 7900 GTX and 7900 GT, but it's clocked higher than the latter and lower than the former. (We'll examine Nvidia's other new part—the 7900 GS, which offers 20 pixel shaders and 7 vertex shaders—in the next issue.)

We've reported extensively on HDCP lately, so we'll touch on it only briefly here: If you intend to install a Blu-ray or HD-DVD drive in your PC now or before you make your next videocard upgrade, you'll need a videocard *and* a monitor that support this DRM technology in order to watch Hollywood movies. This isn't an issue if you use your videocard's analog output and your monitor's analog input, but that rather defeats the purpose of having digital gear.

EVGA tweaked Nvidia's reference design, adding a more robust cooling solution in the form of a large copper heatsink that extends over both the GPU and the memory (Nvidia's design covers only the GPU) and a slightly bigger fan. The fan is slightly louder than most 7-series cards we've tested lately, but it's not intolerable. More importantly, it enabled EVGA to modestly overclock the GPU to 560MHz (an increase of 10MHz) and the memory to 725MHz (an increase of 25MHz).

There might be some additional headroom for end users interested in pushing the clock limits with Nvidia's *Coolbits* overclocking utility; but since Nvidia's warranty policy is more conservative than ATI's when it comes to overclocking, we don't factor overclocking performance into our reviews. (To be fair, ATI's *Overdrive* utility is a more conservative tool than *Coolbits*.)

We anticipated that cards based on Nvidia's 7950 GT would be competing against cards based on ATI's X1900 GT; but looking at street prices as we went to press, it seems ATI vendors are intent on pitting Nvidia's latest against ATI's retuned X1900 XT, instead. If that's the way the market is going to stay, Nvidia and its proxies are going to have quite a battle: The X1900 XT—even with half the frame buffer—comes out the clear winner in most of our real-world benchmarks.

We still consider Nvidia's SLI to be the superior dual-GPU solution, however; and ATI hasn't done anything to improve its HQV scores. And then there's the whole issue of the wisdom of buying *any* new videocard this close to the debut of Direct3D 10.

—MICHAEL BROWN

SPECS

GPU	Nvidia GeForce 7950 GT
MEMORY	512MB GDDR3
CORE CLOCK SPEED	560MHz
MEMORY CLOCK SPEED	725MHz
HDCP SUPPORT	Yes

BENCHMARKS

	GEFORCE 7950 GT	X1900 XT (256MB)	GEFORCE 7950 GT IN SLI	X1900 XT IN CROSSFIRE
3DMARK06 GAME 1	12.1	**16.5**	21.9	**29.9**
3DMARK06 GAME 2	17.0	**17.2**	31.2	**32.3**
QUAKE 4	56.0	**59.6**	99.3	**99.7**
OBLIVION	18.4	**23.1**	24.2	**24.3**
FEAR	**34.0**	27.0	**62.0**	49.0
HQV	**88**	63	**88**	0

*Scores other than HQV stated in frames per second. Best scores in single- and dual-card modes are bolded. Videocard benchmarks run at the native resolution of a ViewSonic VP2330wb display: 1920x1200. **3DMark06** HDR tests: Antialiasing turned off and anisotropic filtering set to 8x. **Quake 4:** AA set to 4x and aniso set to 8x. **Oblivion:** AA turned off, high dynamic-range lighting turned on, and all other values set to maximum. **FEAR:** AA turned off and soft shadows enabled. ATI cards tested in an Asus A8R32-MVP Deluxe motherboard; Nvidia cards tested in an Asus A8N32-SLI Deluxe. AMD's dual-core 2.6GHz FX-60 CPU installed in each, along with 2GB of DDR400 memory.*

EVGA E-GEFORCE 7950 GT KO

BEANSTALK

HDCP support, 512MB frame buffer, and a single-slot cooler.

STALKER

Gets beat up by ATI's cheaper X1900 XT.

7

$300, www.evga.com

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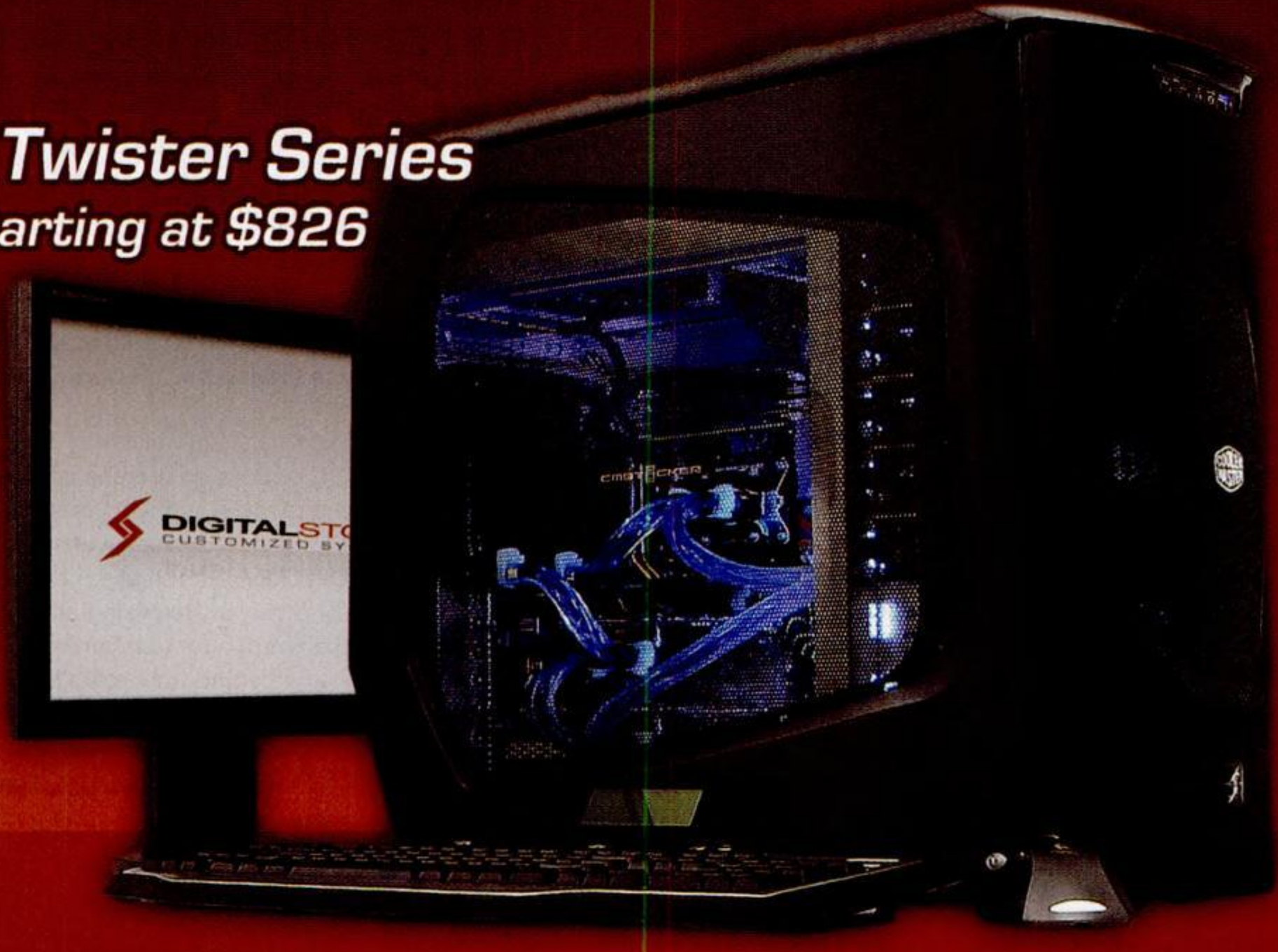

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Conroe Cometh!

Core 2 is hot. If you're on the cusp of a system upgrade, look no further for your mobo needs

Intel's D975XBX will be the yardstick we use to measure all Core 2 boards.

OK, Intel fans, it's finally safe to come back into the glorious daylight. We know you've been lurking Gollum-like in your caves for two years while roving bands of AMD users combed the hills with pitchforks and torches. Now is your time!

To help you re-acclimate to the surface world, we're taking a microscope to three hot new Intel LGA775 boards that are Core 2 Duo/Extreme ready. Even better, all three boards will likely support Intel's upcoming quad-core processor, so enjoy it outside—you might be there for some time.

—GORDON MAH UNG

INTEL D975XBX

We admit that we haven't given Intel's motherboard division enough props lately. But that's because, short of Intel making Athlon 64-based motherboards, there hasn't been a reason to own an Intel board for the last two years.

With Core 2 CPUs now *the* chips to own, the D975XBX "Bad aXe" is suddenly a compelling option. The board was originally introduced with the dual-core Presler CPUs last year, but one thing is new: support for Core 2 chips. Only D975XBX boards with Altered Assembly codes (fancy-speak for board versions) of 304 will work with Core 2's lower voltage requirements. Fortunately, Intel says it has been shipping Core 2-ready versions of the board for months, so you should expect a plentiful supply of 304 versions on store shelves.

The D975XBX sports some pretty interesting features—including three physical x16 slots, which will allow you to run dual graphics cards plus a third card for physics support. The two graphics cards will run at just x8 speeds, but honestly, we haven't seen a significant performance boost yet from running dual cards at x16. Of course, because this is an Intel board, you can only run ATI's CrossFire cards—Nvidia hasn't given Intel's chipsets its dual-GPU blessings. That leaves Intel and the 975X chipset in a tough spot. What if ATI took its ball home and stopped supporting Intel chipsets for CrossFire?

In performance, we didn't see the D975XBX run away from the two P965-based boards, but it performed well. Still, we expected more from an "enthusiast" chipset.

The board is certainly able to overclock, however. Although the BIOS' OC options are confusing, many of the Internet overclocking records for Pentium D and Core 2 chips were set using the D975XBX. That makes the it a great board for those overclocking aspirants who want the warm and fuzzy embrace of the Intel name behind their motherboard.

INTEL D975XBX

LED
Three x16 PCI-E slots; a good overclocker; Intel reliability.

IED
No SLI nor eSATA support.

9

$275, www.intel.com

FOXCONN P9657AA-8KS2H

Intel's "Broadwater" P965 chipset, used in the Foxconn P9657AA-8KS2H, epitomizes Intel's new philosophy of evolution, not revolution. So it's not surprising that the P965 chipset makes no quantum leaps, but it does include several interesting new features.

There's the "fast memory access" feature which is a further refinement of the memory controller. We didn't see any performance advantage from it, but it's possible the optimization is helpful to the 965G version with integrated graphics. The new ICH8 south bridge now supports eSATA and six SATA 3G ports and does away with parallel ATA ports. Does that mean you have to buy a SATA drive to install your OS? No. Board vendors

BENCHMARKS

	INTEL	FOXCONN	GIGABYTE
SISOFT 2007 MB/S	**5,631**	5,418	**5,628**
QUAKE IV HIGH-QUALITY@12X10 (FPS)	**146**	143.5	143.6
3DMARK 2001 SE	45,285	**45,789**	**45,738**
3DMARK 2003	**25,598**	**25,632**	25,231
3DMARK 2005	**11,473**	11,376	11,159
3DMARK 2006	**6,385**	**6,352**	6,295
FEAR (FPS)	**318**	**318**	304
PC MARK 2005 RAM	**5,911**	5,703	**5,919**
PC MARK 2005 GPU	8,561	**8,988**	8,809

Best scores are bolded. We used an Intel Core 2 Extreme X6800, 2GB of DDR2/800, a Western Digital 400GB SATA drive, and an Nvidia GeForce 7900 GTX with Windows XP Pro.

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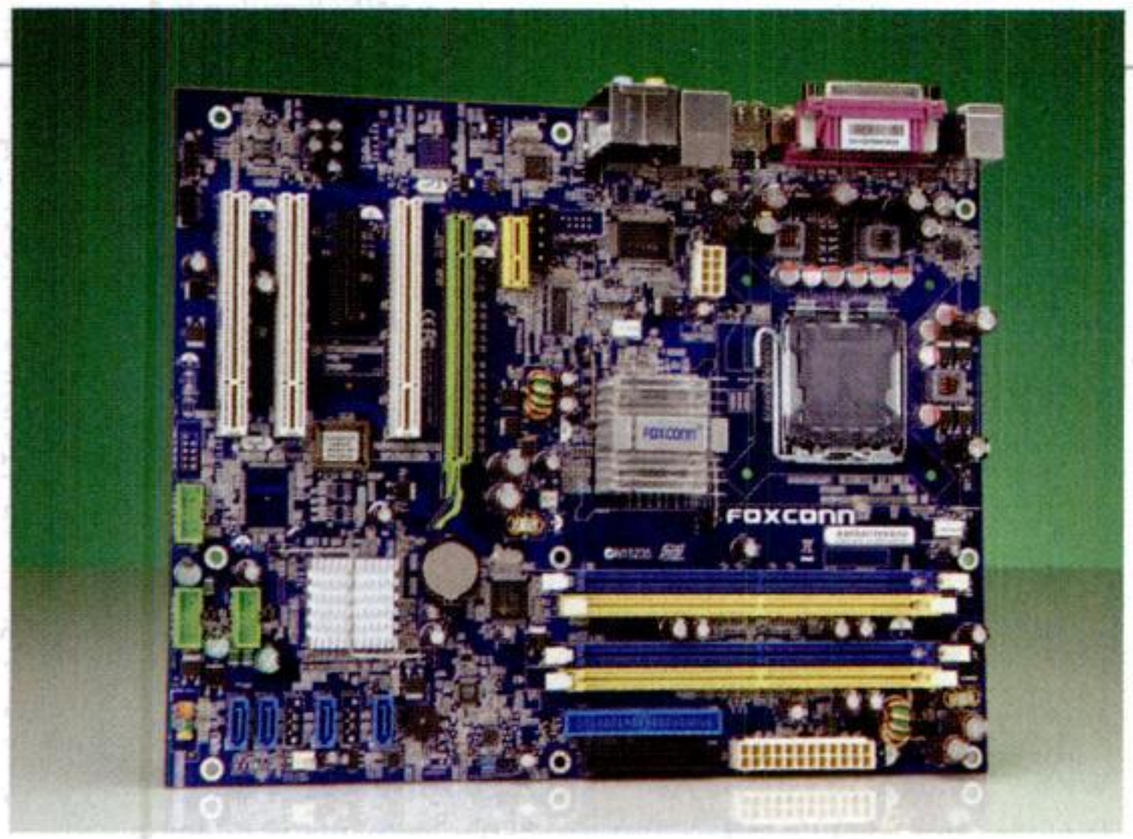
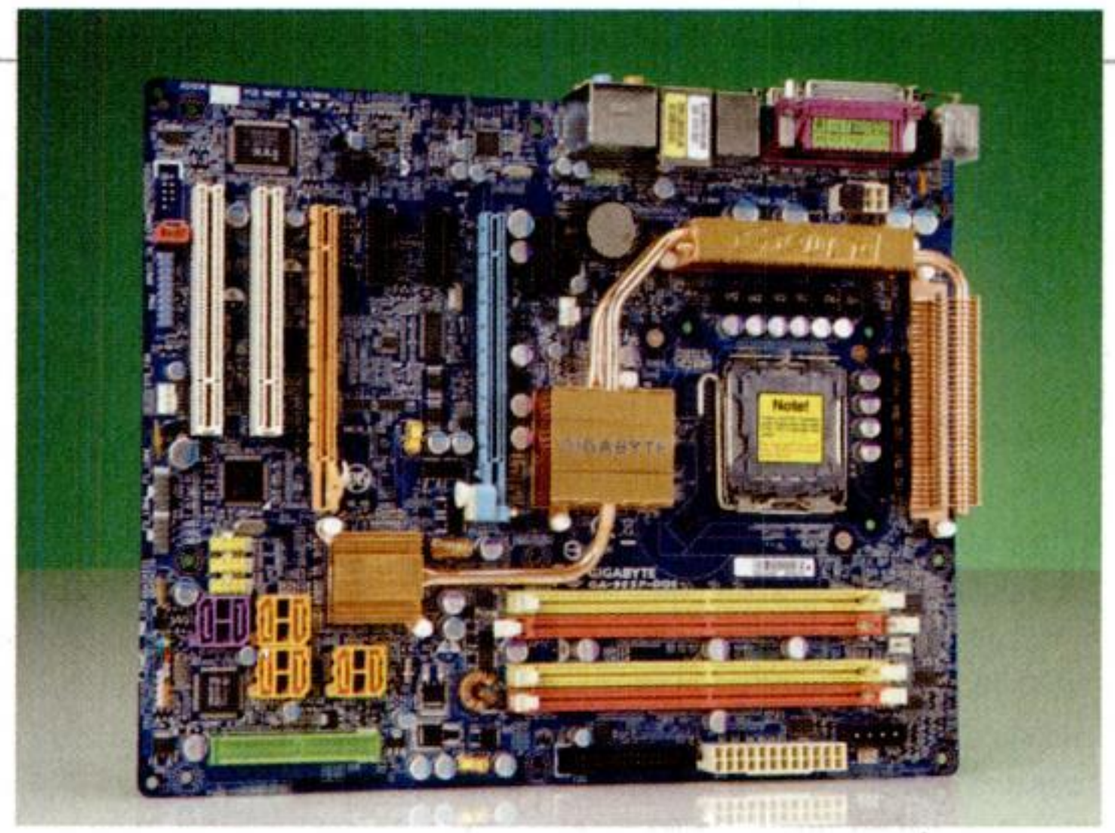


Foxconn's 965 board is threadbare on features but gets you aboard the Core 2 train.



Gigabyte ladles on the features, including its trademark dual BIOS.

have integrated third-party controllers into the chipset to add support for plain-old PATA optical drives. It's confusing, though. We were initially thrown off by Foxconn's BIOS configuration, but we eventually figured things out by digging through the entire list of boot devices.

For all intents and purposes, the board mainstream—in other words, stripped. ere's no support for dual PCI-E graph- cards and only four SATA 3G ports plus SATA port. Heck, you don't even get re ports. That makes the P9657AA- pretty ho-hum.

board is a poor-boy's choice for uo, but it certainly ain't slow. with the same components as wo boards here, Foxconn's board npetitive performance numbers. ce that the P9657AA-8KS2H in two of the synthetic memory despite all boards having settings. That discrepancy anywhere else though, and said, real-world tests are than synthetics.

-8KS2H exists to get you without taking a fire axe , but it's also so short ran out of things to

ption routers g sup- t it's the al to add devices. enviable

657AA-8KS2H

nd

7

4

nnchannel.com

GIGABYTE GA-965P-DQ6

There are feature-rich boards and then there are triple-decker-chocolate-cake-with-a-side-of-ice-cream Gigabyte boards.

Gigabyte's GA-965P-DQ6 is just such a heaping helping of decadence. We'd have to be hopped up on a case of Vicks 44 to dream up all the real and imaginary features that this board boasts. Its specs include no fewer than six "quad"-labeled features (making it hexa-quad, perhaps?)

There's the "quad BIOS" (primary and backup flash ROMs plus CD and floppy restore options); the "quad cooling" (heatsinks or heat pipes on four different components); the "quad eSATA" (adapters to run four eSATA drives); the "quad triple-phase" (we don't know what the hell this is); the "quad DDR2" (translation, four DDR2 slots!); and, of course, the quad-core support. While we know that a bulk of these "quad" features are marketing puffery, the fact that Gigabyte is confident enough to risk legal action from a disgruntled consumer if quad-core doesn't work gives us faith in this board's future upgrade path.

Beyond all the quad BS, the GA-965P-DQ6 is a pretty nice board. With eight SATA ports and a unique approach to dual-videocard support, the board pushes the envelope. It's a performance board built on a mainstream chipset.

The P965 chipset doesn't support running dual videocards so Gigabyte plumbs four PCI-E lanes to the second x16 slot from the ICH8R south bridge. It's clever, but it's still a kludge. (The D975XBX splits the single x16 slot in the north bridge into two x8's for more balanced dual-GPU support.) Balanced x8 slots are better for dual-GPU graphics, but for other applications, such as physics, all you'll need is a x1 or x4 slot. If GPU-based physics acceleration takes off, the Foxconn board won't even give you the option of using a second GPU because it sports only one x16 PCI-E slot.

The GA-965P-DQ6 didn't perform as well as Intel's board, but it's still respectable. We have some concerns, however. While the Gigabyte board didn't lag in the synthetic RAM bandwidth tests, it was the slowest of the three boards here in the more intensive GPU-weighted tests. That's odd, as we expected better performance from the newer P965's updated memory controller. Still, our benchmark results were all over the map, with different boards taking different categories by tiny margins.

GIGABYTE GA-965P-DQ6

USB

Eight SATA ports, tons of features, and quad support make it a good buy.

ZIP

Odd PCI-E configuration and poor performance in GPU tests.

8

$240, www.gigabyte.us

WHAT TO BUY

We think Intel's D975XBX gives you the most flexibility with its sanctioned (for now, at least) dual-GPU support. It lacks eSATA, but that's easily remedied with an adapter cable and bracket. Its performance is great and Intel has publicly showcased the board's quad-core capabilities. While we like the Gigabyte board, the odd PCI-E configuration gives us the willies, and the Foxconn board is just too lacking in features.

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Seagate Pushbutton Backup 750GB

One step closer to the perfect backup drive

With 750 luscious gigabytes of storage, the Seagate Pushbutton backup drive can probably back up your main drive *and* your current backup drive.

Backup drives are typically all about one thing and one thing only: sex appeal. OK, we jest, but they really *are* about one thing, and that's capacity. Most people don't really care how fast the drive is, how much cache it has, and so forth. All it has to do is hold all of your data, and do so quietly. Thus, we find Seagate's 750GB Pushbutton drive aptly named: Its combination of massive capacity and easy-to-use software is definitely *pushing our buttons*.

Now, at first glance, the Pushbutton drive seems to resemble every previous Seagate drive. And for the most part, it does—we'll grant you that. But that's just because it employs the same plastic chassis as the others. It's a functional design that keeps the drive cool and quiet, and that can be positioned vertically or prone. We like the chassis, save our usual criticism—there's a lot of wasted space on the front. It would be more functional if it had a built-in USB port or media reader.

Inside the case is the biggest, fastest 7,200rpm drive we've ever tested—Seagate's 750GB Barracuda 7200.10. It sports a 16MB cache, which is a little goofy because the USB/FireWire interface gimps the drive's performance. Though it's capable of 60MB/s-plus read speeds over the SATA interface, it can hit just 35MB/s on average over USB and FireWire. It's fast enough, for sure, but unlike its eSATA counterpart (reviewed in the November issue), we won't be installing games on this drive, or using it in a *RAID array*.

Backup duties are performed by the ever-capable *BounceBack Express* software. It's a relatively simple bundle, but it covers the basics of backup and file recovery with aplomb. It's not as full-featured as Maxtor's software (you can't password-protect backups, for example), but it gets the job done.

Sure, we love the massive capacity, but USB/FireWire is old-school at this point. Drop this drive into an eSATA enclosure and it'd be a Kick Ass drive for sure.

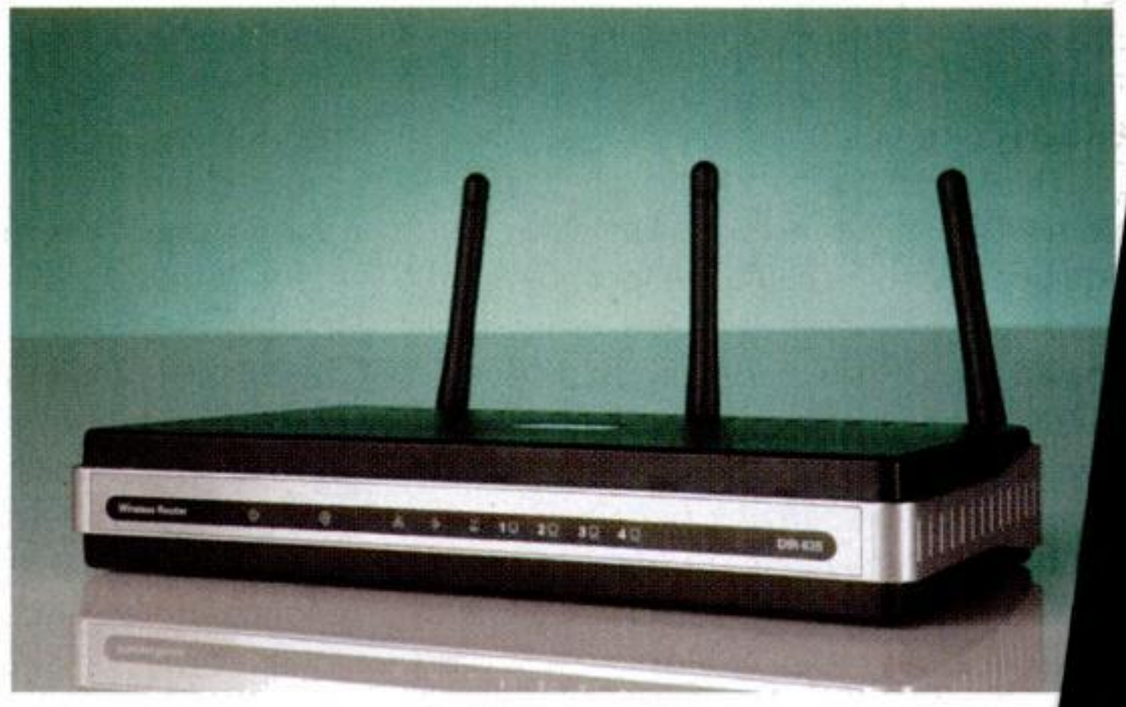
—JOSH NOREM

SEAGATE PUSHBUTTON 9

$550, www.seagate.com

D-Link RangeBooster N650 Router

The beatings will continue until morale improves



D-Link's DIR-635 features quality-of-service technology, so you configure it to assign some packets higher priority than others

The pre-N/Draft-N fiasco shows no sign of letting up, with the final spec now likely delayed until 2008. But all this uncertainty hasn't slowed the pace of new products based on this quasi-spec written in sand.

D-Link calls its model DIR-635 Draft-N router the RangeBooster N 650 because it's supposedly 650 percent faster than 802.11g routers. And maybe it is—in the Mojave Desert, inside an empty warehouse, with a very high ceiling and no interior walls. The results we achieved in a real-world suburban home were an order of magnitude more modest.

Paired with D-Link's DWA-645 Draft-N notebook adapter, with the wireless adapter in the same room as the router and with WPA-PSK encryption enabled, we observed anemic connection speeds of just 130Mb/s and actual TCP throughput of just 34.8Mb/s. D-Link's claim of improved range rang more true for us. Moving the notebook to our second test location, which is about 25 feet from the router with four gypsum walls in between, had almost no impact: We still saw encrypted TCP throughput of 34.1Mb/s.

Throughput took a major, but not unexpected, hit when we moved o doors for our long-range test. On a patio surrounded by trees about 75 from the router, we logged throughput of 13.9Mb/s.

The Atheros Xspan chip that D-Link uses doesn't support WEP encry in hardware, which has caused performance problems for other Draft-N that handle it in software. The DIR-635 bypasses the problem by omitti port for WEP altogether. WEP is a weak security solution, to be sure; bu *only* security that some older gear has to offer. And while it's no big de a new adapter to a notebook, you can't do that with media-streaming If you're still using such products, the DIR-635 leaves you with two u choices: Ditch the old gear or run your wireless network with no security at all.

—MICHAEL BROWN

D-LINK DIR-635

$130, www.dlink.com

BENCHMARKS

	D-LINK DIR-635
TCP THROUGHPUT IN ENVIRONMENT 1	34.8Mb/s
TCP THROUGHPUT IN ENVIRONMENT 2	34.1Mb/s
TCP THROUGHPUT IN ENVIRONMENT 3	13.9Mb/s

Best scores are bolded. All temperatures were measured via the onboard sensors, using the Asus A.I. Booster utility. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

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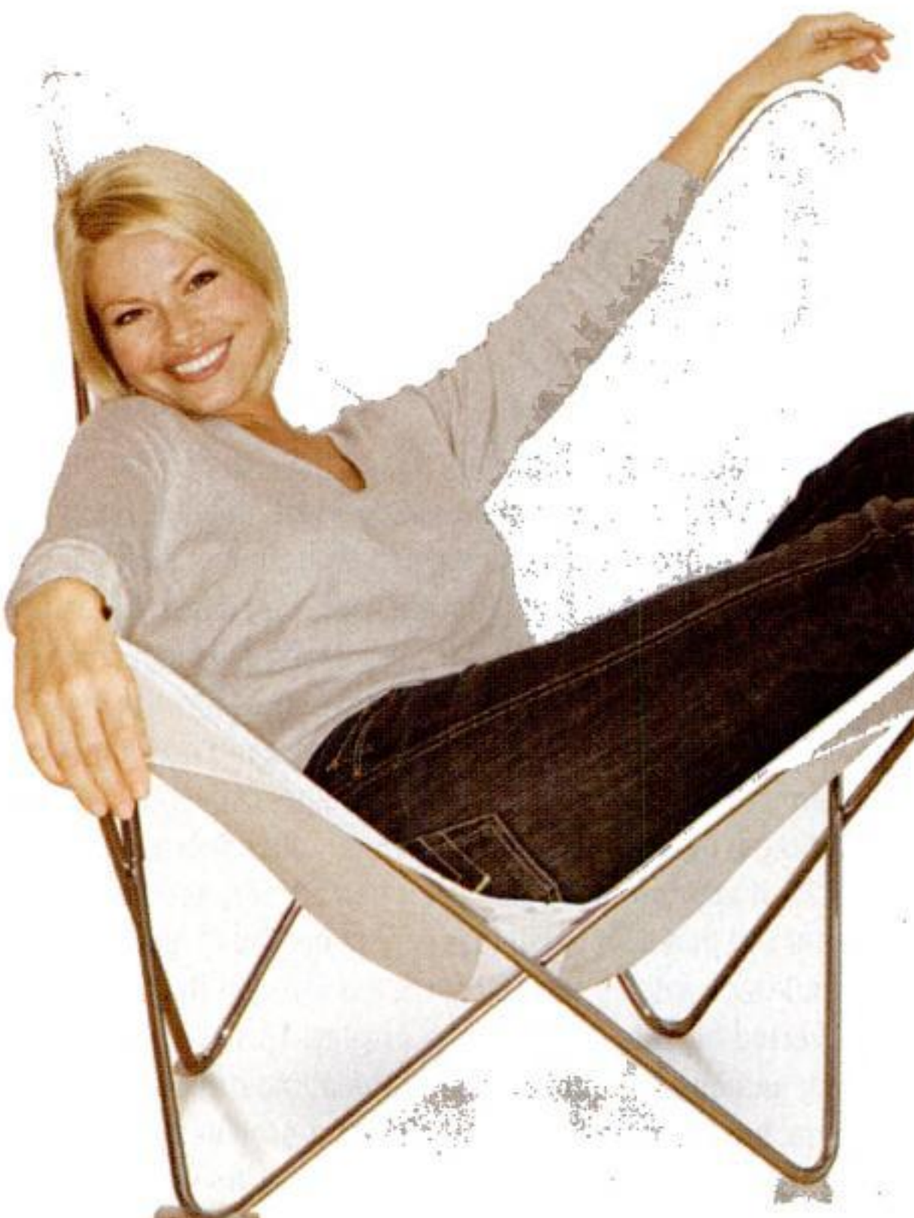
It's all about you.

The music you need.

The room you love.

The sound you require.



SoundBridge is a network music player that plays your Mac or PC music library and Internet radio in any room of the house, connecting your stereo or powered speakers to the music you love via Wi-Fi or Ethernet.

SoundBridge Radio is a simple, high-performance compact system that's ready for the digital world. You get unsurpassed stereo sound, Wi-Fi music streaming, Internet radio, AM/FM radio, dual alarms with volume ramp, auto-dimming vacuum fluorescent display, and 18 presets that make it a snap to access your favorite stations, playlists or any music search you desire.

Wireless Internet radio and music streaming from Roku

Roku's SoundBridge products are compatible with iTunes®* and Windows® Media Connect music player software, Rhapsody™, Musicmatch™, and any PlaysForSure™ music service such as Napster, MSN Music and Walmart.com.

Take your music Wi-Fi today!

Visit rokulabs.com/mpc or call 1-888-600-ROKU

Roku

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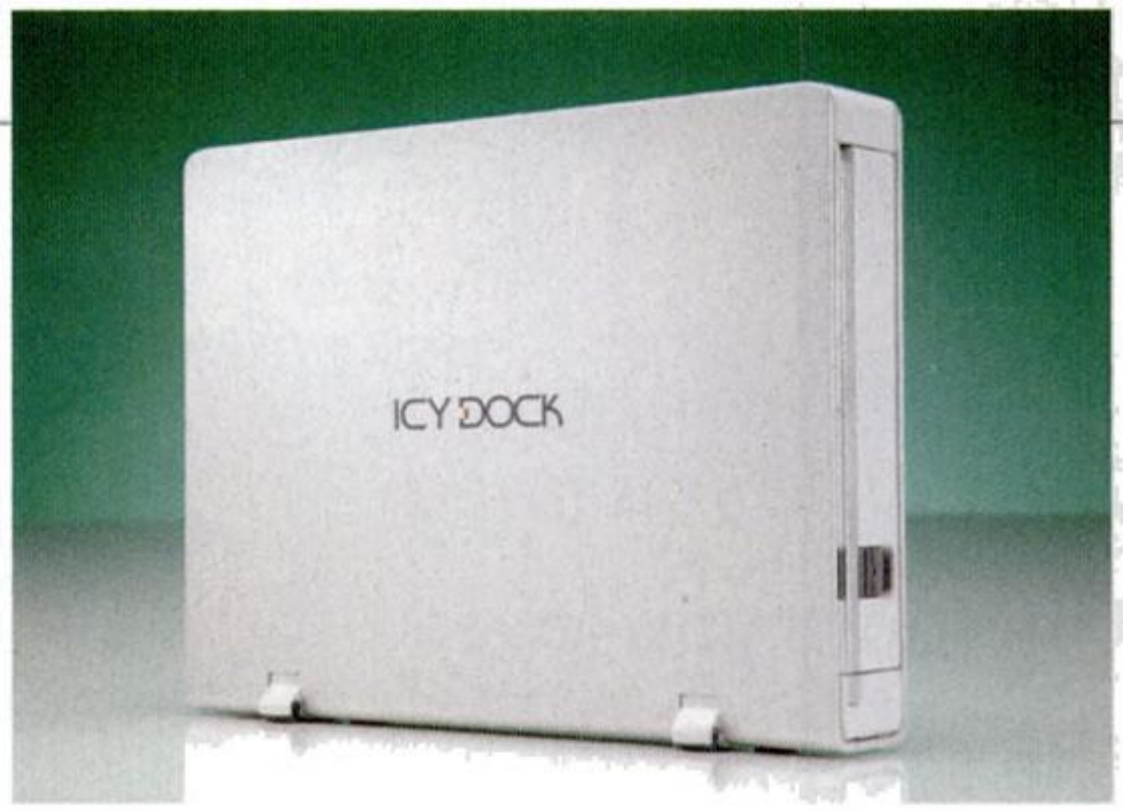
IcyDock MB559-1S

Speed and convenience wrapped into one hard drive enclosure



The IcyDock features both eSATA and USB 2.0 ports, for convenience on the road and speed at home.

Can't choose between the convenience of USB 2.0 or the speed of eSATA? You don't have to with IcyDock's MB559-1S drive enclosure, which gives you both connectors for whatever SATA drive you choose.

When paired with Seagate's 750GB Barracuda 7200.10, the enclosure performed exceptionally. We were a little concerned that the eSATA controller inside the enclosure would throttle all disk accesses down to USB 2.0 speeds—regardless of the interface we actually used—but the benchmark results in *HD Tach* were on par with the same drive plugged directly into a SATA 3G port. We also compared IcyDock's solution to a WiebeTech SATADock V4, which uses the speedy Oxford 924 chip, and found the MB559/Cypress combo a tick faster in USB modes.

And if your motherboard doesn't have eSATA, no problem! Using the supplied eSATA bracket, you can connect the enclosure to an internal port on your motherboard. The cable from the bracket to the motherboard is a bit shorter than we'd like, but it's an easy way to use an eSATA drive on a board that lacks native ports.

Here's the really interesting thing: IcyDock plans to introduce a four-drive cabinet this fall that'll work with the MB559-1S. Just unlock the drive, pull it out of the MB559-1S, and then insert it into the cabinet to achieve RAID operation or a ton of storage on speedy eSATA drives.

In all, it's a pretty sweet deal, although we're a little concerned about shock resistance. While it's obviously best to never move an external drive when the platter is spinning, few follow this mantra. We'd feel better about housing our 750GB drive in an enclosure that offers a little more cushioning. Other than that, there's not much to dislike about a product that does away with the eSATA-or-USB 2.0 debate

—GORDON MAH UNG

BENCHMARKS

	HD TACH AVERAGE READ	HD TACH BURST	CPU UTILIZATION
MB559 (USB)	37.4MB/s	37.7MB/s	4%
SATADOCK V4 (USB)	35.4MB/s	37.4MB/s	2%
MB559 (ESATA)	65.8MB/s	248.2MB/s	2%
HD (INTERNAL SATA)	65.8MB/s	249.6MB/s	2%

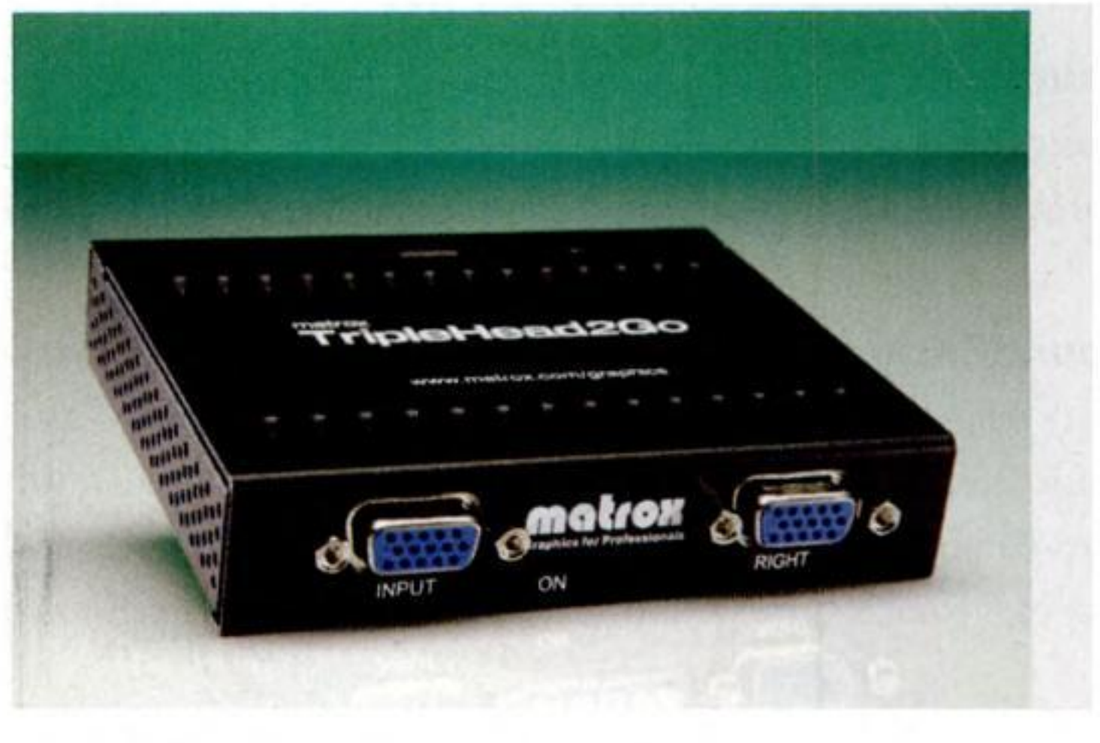
We used a 750GB Seagate Barracuda drive with our standard Athlon 64 FX-60 zero-point system.

ICYDOCK MB559-1S **9**

$70, www.icydock.com

Matrox TripleHead2Go

Go wide, real wide



Matrox's TripleHead2Go enables you to connect three monitors to one videocard, but it doesn't support any 16:9 aspect ratio resolutions.

How would you like to connect a virtual 69-inch monitor to your PC? You can with Matrox's TripleHead2Go. Hook this box up to your videocard, plug in three 23-inch displays, and you'll be gazing at nearly 5.5 square feet of screen real estate. But just because you can doesn't mean you'll want to.

We're not denying that the TripleHead2Go is ingenious. Plug three real monitors into the box and you can drive them all with just one videocard, even while gaming. That's something you can't do with *two* Nvidia or ATI videocards running in SLI or CrossFire mode, respectively. But we found Matrox's solution to be compromised by several other shortcomings.

First and foremost, this is an analog-only product. If you're using a digital flat panel, you will lose image quality as your videocard's digital output is converted to analog, routed through the TripleHead2Go, and then converted back to digital at the display. This is less of an issue if you're using analog CRTs, but refresh rates at most resolutions are limited to a headache-inducing 60Hz. While Matrox provides a utility that boosts the refresh rates at some resolutions to 85Hz, the software is incompatible with ATI Radeon X1000-series cards.

Install Matrox's drivers, set your videocard to 3840x1024, and the TripleHead2Go will split this into three 1280x1024 segments. That's fine if you're using analog CRTs or digital displays with a native resolution of 1280x1024, but larger monitors that don't perform scaling will display black borders—and those that do perform scaling will exhibit artifacts.

We used Matrox's *Surround Gaming* utility to configure *FEAR* and *Age of Empires III* for the TripleHead2Go's unique capabilities. We found playing the shooter in this super-wide point of view to be wildly disorienting. The RTS experience was slightly more enjoyable, but the monitor bezels split the game's menus in awkward places and rendered them difficult to use.

The TripleHead2Go is pretty slick for productivity applications, though; assuming your motherboard can't run two videocards, you don't plan to upgrade it, and you don't mind being limited to 1280x1024 resolution.

—MICHAEL BROWN

MATROX TRIPLEHEAD2GO **6**

$300, www.matrox.com

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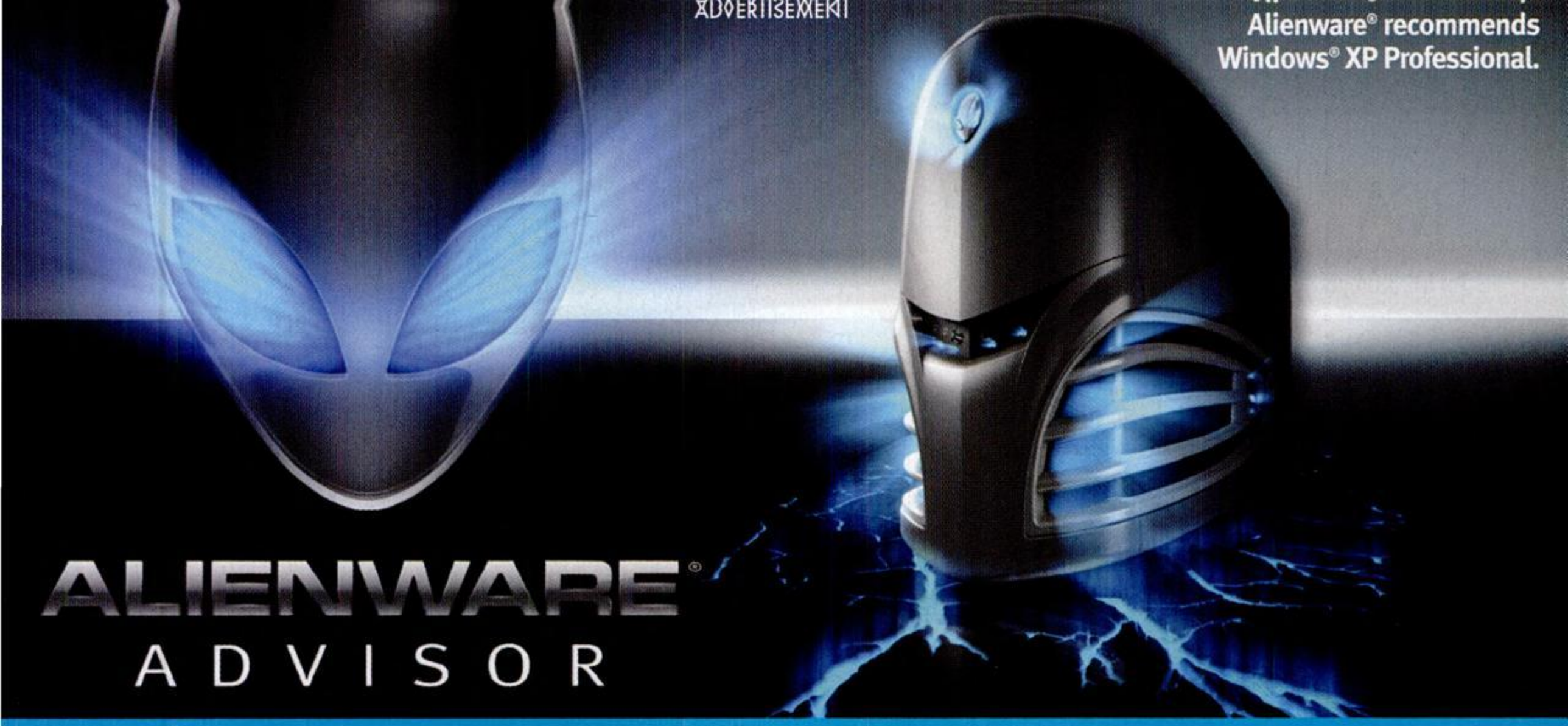
Windows® XP Professional.



ALIENWARE® ADVISOR

HD-DVD and Blu-ray: It's All About the Lasers.

HD-DVD and Blu-ray are competing, and currently incompatible, next-generation optical storage formats for high-definition video or data. Although an effort was made in 2005 to combine the two, powerful industry players failed to reach an agreement and are currently fueling a format war that promises to become the next VHS vs. Betamax fight.

Blu-ray Disc™

HD DVD™ ROM

How Do They Work?

Laser technology is the key to HD-DVD and Blu-ray — blue lasers to be precise. In comparison to the red lasers used to embed and extract information from current DVD's, shorter wavelength blue lasers allow for more 'tightly-packed' data, enabling significant improvements to features, storage capacity and playback. On a single-layer disc, this translates to playback of a movie in full HD resolution or the recording of a couple of hours of HD content.

What are the Similarities and Differences?

The similarities? Both formats support single and dual layers, have similar data transfer rates and share common output resolutions, soundtrack support and increased interactivity.

The differences? Interactivity features on Blu-ray are based on Sun Microsystems' Java while HD-DVD relies on iHD, the brainchild of Microsoft® and Toshiba. Blu-ray currently boasts greater storage capacity; 25GB on a single layer and 50GB on dual layers compared to HD-DVD's 15/30GB. However, the most important difference may be in production. Blu-ray discs are formatted differently from current gen DVDs, forcing disc manufacturing and replication plants to invest significant dollars in upgraded or retooled gear if they wish to produce them. HD-DVD discs are more similar to the current gen DVD format, allowing them to be produced with little additional cost to the end manufacturer; however, both will retail for around $19.99.

How Does This Affect the Consumer?

The first Blu-ray and HD-DVD players are making it to market now and you'll most likely see them integrated into PC's and gaming consoles soon. The current players boast backward-compatibility with last gen DVD's and the ability to upconvert standard DVD content to 720p or 1080p. Although there is promise that manufacturers will begin building combo players that support both formats, if you want to get in the game at this point, you'll have to choose your weapon.

Aurora™ 7500

Alienware will feature next-generation Blu-ray drives in their Aurora™ ALX™ and Aurora™ 7500 high-performance desktop systems.

www.alienware.com/awadvisor

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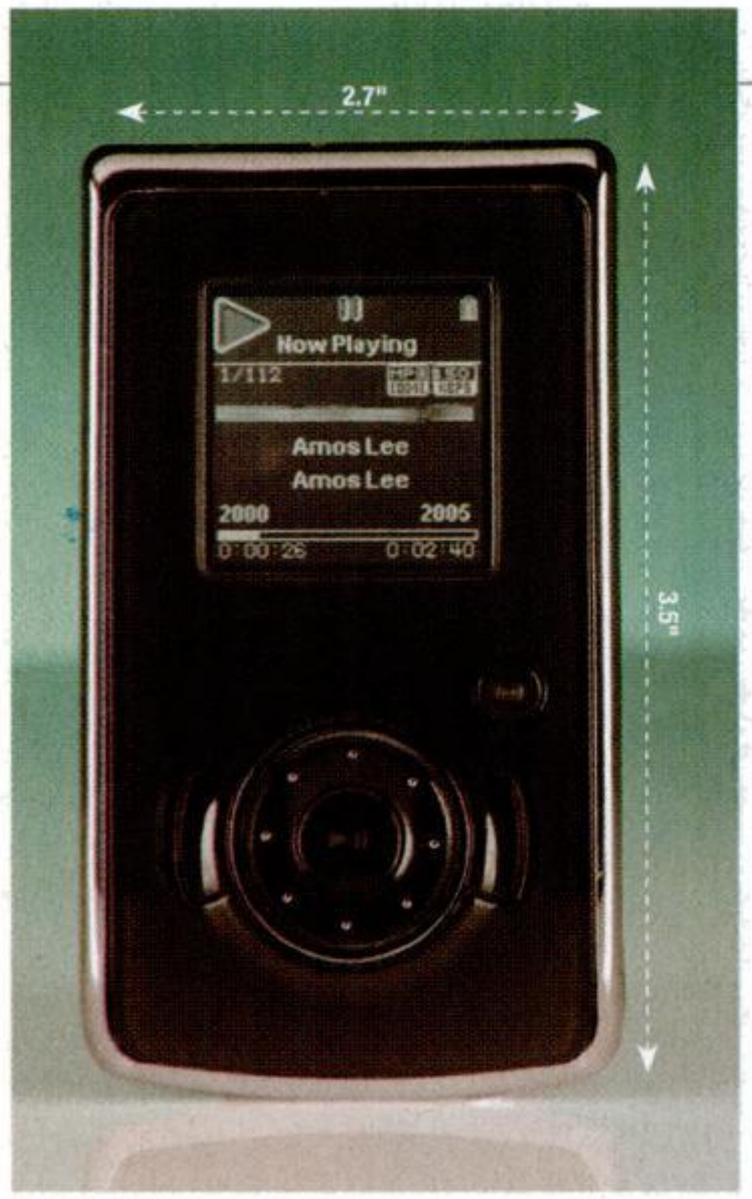
RCA Lyra Jukebox H116

An MP3 player for the poodle-skirt set



French consumer-electronics behemoth Thomson continues to throw RCA-branded MP3 players at the wall, but products like the Lyra Jukebox H116 are unlikely to stick.

The MP3-player market has gone color, but Thomson (the company that owns the RCA brand) apparently didn't get the memo: Its new 6GB RCA Lyra H116 is outfitted with a 1.5-inch, monochromatic LCD that reminds us of the RCA televisions our grandparents used to watch The Huntley-Brinkley Report back in the 1950s.

Given the Lyra H116's lackluster display, it should come as no surprise that this player also bucks the trend of incorporating photo and video capabilities into small devices. It supports only MP3, Audible, and WMA file formats (including Microsoft's Plays For Sure, for compatibility with subscription music services).

The player doesn't get very loud, and RCA's earbuds are dreadfully uncomfortable (as is all too common with bundled buds), but the combo delivers good audio quality. They impressed us with their ability to handle the diverse timbres in The Chieftans' "Magadelene Laundries," ranging from Joni Mitchell's heart-rending vocals, to the tingling Celtic harp, to the massive bass drum subtly reverberating on the down beat.

You control the player with a multifunction scroll wheel with a play/pause/select button in the center and two browse buttons on either side. A fourth button, labeled "M," allows you to navigate nested system menus without interrupting the music. The LCD displays a lot of information for its size, but it proved incapable of scrolling text without smearing.

Given that the player uses a 6GB mini hard drive for storage, we were pleasantly surprised to discover that it starts up in less than 10 seconds. The drive proved remarkably resistant to shocks, too: We subjected it to several 15-inch drops onto a hard surface and it never skipped a beat.

Many MP3 manufacturers have differentiated their products by adding FM radio tuners and built-in voice recorders—features of dubious value. The Lyra doesn't offer either of these, favoring something more useful: an FM transmitter so you can listen to your digital tunes on your car's audio system. Then again, you can pick up an FM transmitter for any MP3 player. Buy the Lyra H116, and you'll be stuck with its Eisenhower-era screen forever.

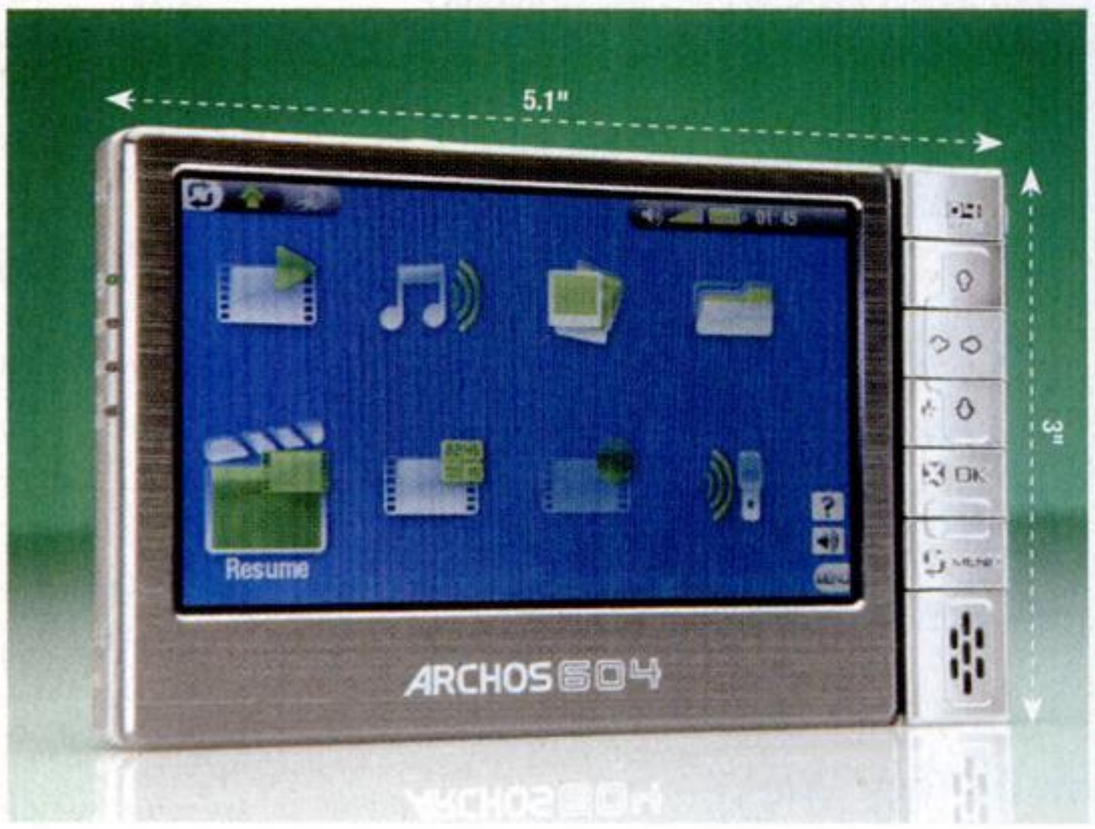
—MICHAEL BROWN

RCA LYRA JUKEBOX **6**

$170, www.rca.com

Archos 604

This French media player has us doing the can-can!



The Archos 604's sturdy shell is fabricated entirely of brushed aluminum, and the handy kickstand is an inspired design element, but—*oooh-la-la*—that display is superb!

Philips's amazing roll-up polymer display will debut in a commercial product—some day. Until the Dutch get their act together, we'll happily dance with the Archos 604. It's a little bulkier than a video iPod, but where Apple dedicates half its player's face to its famous wheel, Archos reserves 90 percent of *its* prime real estate for a luscious LCD.

And which would you rather stare at: the 2.5-inch, 4:3 aspect ratio screen on the iPod? Or the 4.3-inch, 16:9 aspect ratio display on the Archos 604? Before you answer, you needn't worry that the 604 is difficult to use: Archos' engineers have created a terrific user interface despite the large 480x272-pixel screen, using just the five toggle buttons on the right side. Southpaws might have issues, but righties will find they can easily operate the device with a single thumb.

Watching movies, however, does consume battery power at a frightening rate. Archos claims up to five hours of video playback on the built-in screen, but we managed a little less than four. Playing music is less demanding, so Archos promises 17 hours of battery life in that mode. We got about 12 hours, but that was with a tremendous amount of button pushing and screen use (the LCD goes dark after 30 seconds, but comes back after any button press).

Because the 604 is unlikely to enjoy the pervasive third-party support that Apple's iPods command, Archos vows to offer its own full range of accessories, including a slick $100 DVR unit that will record scheduled programming to the Archos 604 from TV and other sources.

We would have appreciated a better carry case (the included pouch only protects against scratches), better-quality earbuds (although the ones provided do have an inline volume control), and a larger hard drive (Archos squeezed a 30 gigger into the svelte, 0.65-inch-thick enclosure), but those sacrifices were likely made to hold the unit's price tag to $350. Archos didn't cut any important corners: The 604 is an exquisite portable solution for playing music and video.

—MICHAEL BROWN

ARCHOS 604 **9**

$350, www.archos.com

MAXIMUM PC KICKASS

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VANTEC

NexStar

EXTERNAL ENCLOSURE

Form and functionality collide with style in the NexStar external hard drive enclosure series. From the sleek mirror-finish NexStar 3 to the network sharing NexStar LX, the NexStar accomodate wide range of needs. Convenient storage, stylish design, SMART active/passive cooling, and NAS server, NexStar gives you the optimized storage solutions. Store and Share your valuable data with Vantec's NexStar!

STORE *n* SHARE

MUSIC DATA PHOTO MOVIE

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NOTEBOOK DRIVE

DESKTOP DRIVE

OPTICAL DRIVE

NETWORK DRIVE

newegg.com · PCMall · TigerDirect.com · ZipZoomfly.com · MICRO CENTER The Ultimate Computer Store · Fry's Electronics Outpost.com · DIRECTRON.COM

for more information on whereto buy please go to

http://www.vantecusa.com/wheretobuy.html

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Fujifilm FinePix F30

This compact thinks it's an SLR

Fuji's F30 might look like a Ford Taurus, but under the hood its pure sports car.

The F30 looks like your basic 6.3-megapixel, 3x optical zoom point-and-shoot—one you might pass right by in the showroom in favor of a flashier model. This would be a mistake, if you're looking for some muscle in a compact camera, along with supreme simplicity. The F30's unassuming looks belie impressive performance that makes it an excellent choice for your next all-around compact camera.

Startup, shutdown, zoom, and shot-to-shot performance are on par with the field, but the F30 exceeds all others in battery life. Usually we recommend picking up a spare battery when a camera is powered by a proprietary lithium-ion pack. While this might always be the safest option, we don't feel it's necessary here: Fuji claims 580 shots per charge and we believe it. We snapped more than 200 pics and made liberal use of the movie mode, and the camera didn't break a sweat.

Still, the F30's real claim to fame is extremely high-ISO performance—up to 3200, in fact—paired with fairly robust manual controls (aperture, shutter, ISO, white balance, exposure compensation, etc.). While our test shots at 3200 were largely unusable—no surprise there—shots in the 800-to-1600 range (most compacts stop trying at 400) were surprisingly good. The high-ISO performance allowed us to take respectable shots in low-light situations, which is generally a major weak point with compacts.

The movie mode was also better than average, resulting in acceptable-quality AVI clips at 640x480 and 30fps. The menu was very easy to navigate and a bevy of presets accommodates a variety of shooting conditions.

We like the camera's rugged all-metal body, but not its flimsy AC/USB cover, plastic tripod mount, and lack of an optical viewfinder. We're also unimpressed with the F30's continuous shooting modes, which are sluggish, and we're perturbed that an xD memory card is not included, considering the price of the camera. (The camera comes with 10MB of internal memory, which is good for just three shots at the highest resolution.)

—STEVE KLETT

FUJIFILM FINEPIX F30 — 9

$400, www.fujifilmusa.com

Razer Barracuda HP-1 Gaming Headset

This gaming headset bites as hard as its namesake fish

We're disappointed in the sound quality of the Barracuda HP-1 Gaming Headset, but we'll give it another chance when Razer ships its companion soundcard.

We were sufficiently disappointed with Razer's Barracuda HP-1 gaming headset that we tested a second unit in the vain hope that the first was defective. It produced the same results: decent surround-sound effects, but utterly anemic bass response.

And feeble bass isn't this product's only problem. Razer's engineers designed the Barracuda as the ideal partner for the company's upcoming Barracuda AC-1 soundcard. In place of the 1/8-inch connectors that a typical soundcard uses, the AC-1 features a single DVI-style port that also provides power to the headset's built-in amp and de rigueur blue LEDs. The headphone cable ends in a matching DVI-style connector, so Razer provides an adapter with stub cables for audio and USB. Either way, you must reach behind your case and rewire your PC to switch to loudspeakers.

The in-line volume control features an integrated belt clip, but the length of cable between it and the earphone is so short that the clip is rendered useless, leaving the hefty module to swing like a pendulum off the left side of your head. On the bright side, the controller provides a master volume knob, plus separate thumbwheels for the front, rear, center, and subwoofer levels.

But even with the subwoofer pegged to the max, we couldn't coax a reasonable amount of bass from the phones. Explosions and other low-frequency events in games and movies sounded emasculated, and music lacked the crucial foundation that bass instruments lay down.

The Barracuda was moderately comfortable during long listening and gaming sessions, but it's a far cry from the Sennheiser HD-555 headset we tested in our November Head2Head. The thickly padded earmuffs, just big enough to circle our ears, are covered with soft velour; and the suspension-style headband distributes the weight evenly across the top of the head. The unidirectional mic is conveniently removable, but we found its noise-cancellation capabilities lacking.

We could excuse all the Barracuda's other shortcomings if it delivered an awesome audio experience. But to our ears, even the best positional-audio system is a failure if it can't deliver well-defined bass.

—MICHAEL BROWN

RAZER BARRACUDA — 4

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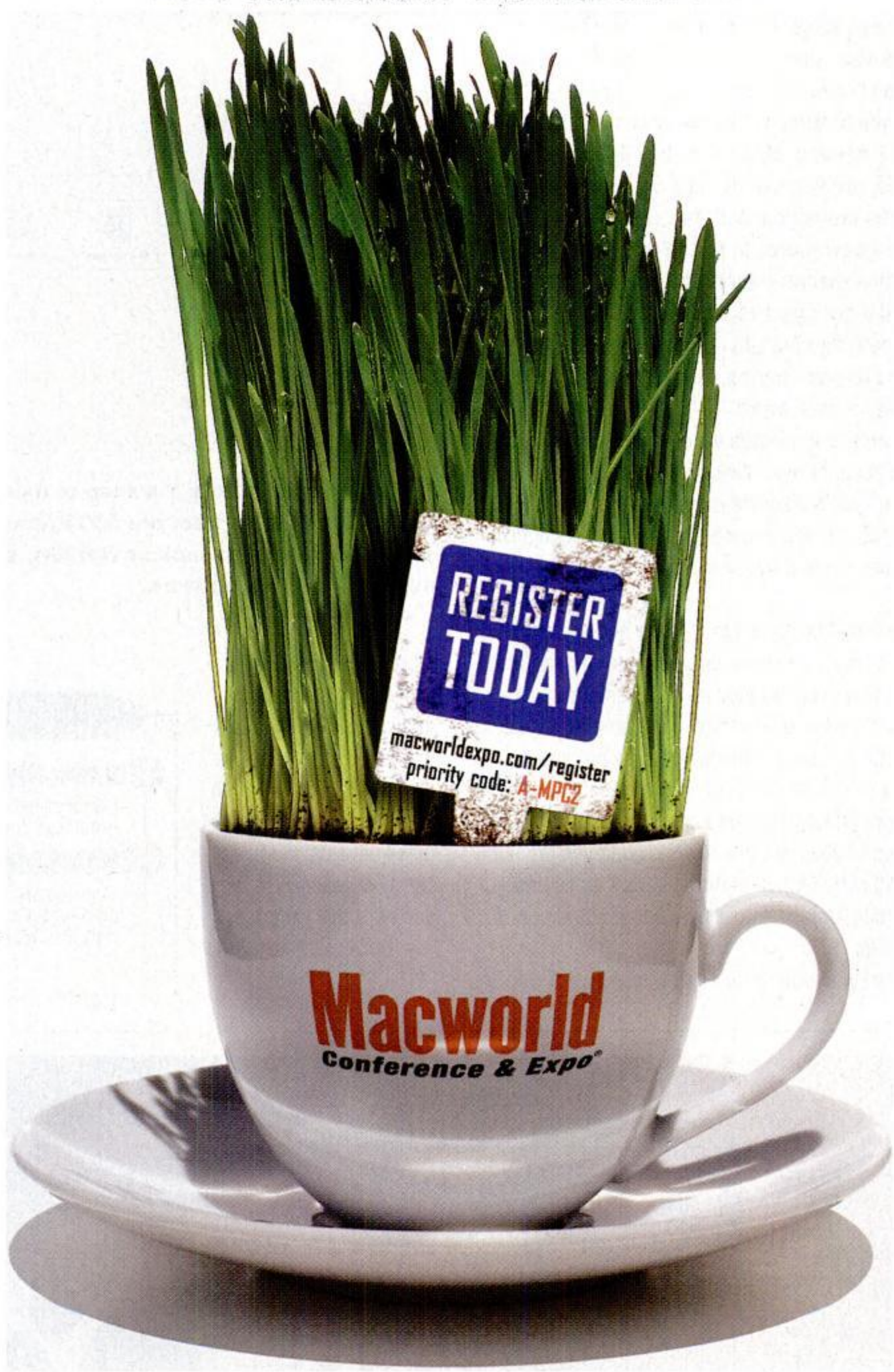

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Network Magic

Stop taking Aunt Emma's tech-support calls!

One of the drawbacks to being an alpha geek is that friends and family come to think of you as their personal tech-support guru. That's not so bad when the questions are limited to "How do I open a file that says 'zip' at the end?" But it gets tiresome when they turn to you to manage their networks.

Convince these folks to install *Network Magic* and they'll be solving their own connectivity and security problems in no time. *Network Magic* doesn't provide firewall or antivirus protection, nor does it eliminate the need for you to initially configure a new router. In fact, it does little that can't be accomplished through other means—assuming you're a networking expert who's thoroughly familiar with your router. But if you can get over its grade-school graphics, you'll find that this program renders LAN management and security, file and printer sharing, remote access, and other networking-related tasks a point-and-click affair.

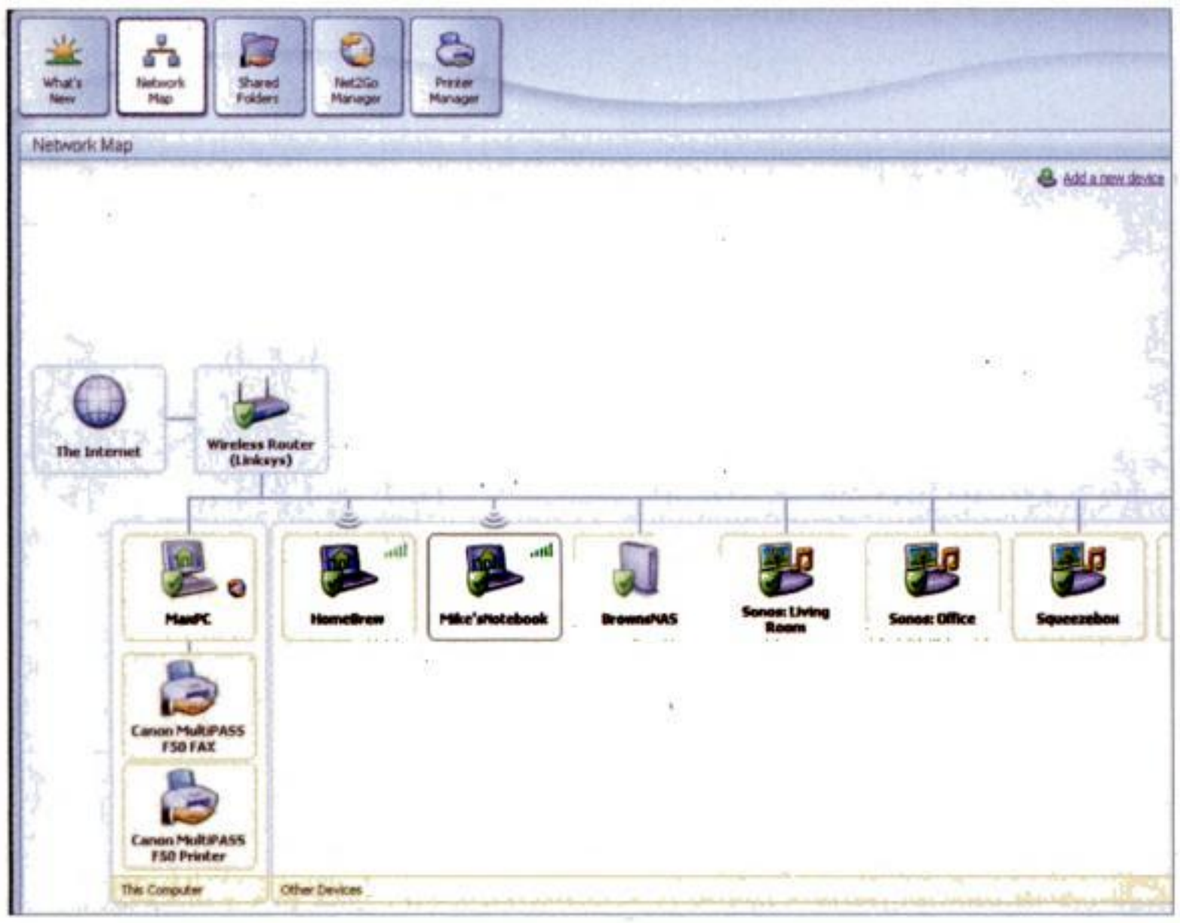
A glance at the program's Network Map reveals every device connected to your network and its potential as a security risk. Click one of these boxes, look in the Device Properties window, and you'll discover everything—from how it's connected to your network to its MAC and IP addresses. If you don't recognize the device, you can track its activities to see if it's an intruder or kick it off your LAN with a click of your mouse.

Network Magic's Net2Go service makes it easy to monitor and securely access your home network from anywhere you have web access. You can also use this tool to share digital photos and even monitor your home with a webcam, all without the need for static IP addresses or third-party hosting services.

Once you've created your Net2Go personal website, for example, you can use *Network Magic's* PhotoCast feature to give folks of your choosing access to photos stored in your shared network folders: Visitors can view the pics online in a slide-show fashion, store copies of your pictures to disk, and even order prints online from Shutterfly. An RSS subscription feature keeps friends and family informed of updates to your site. Unfortunately, only a limited number of routers and webcams support Net2Go.

We'd appreciate *Network Magic* even more if its Net2Go feature enjoyed more widespread support from router manufacturers. We'd also like to see tools that simplify hosting multiplayer game servers. Even with these caveats, we have plenty of reasons to recommend this program.

—MICHAEL BROWN



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Condescending graphics, cool Net2Go features enjoys only limited router support.

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Company of Heroes

The greatest generation presented in the greatest WWII RTS

In *Company of Heroes,* pyromaniacs are great for clearing garrisoned or bunkered-down enemies.

Don't paradrop troops if there are any anti-aircraft guns nearby.

For years, PC gaming has been trying to capture the cinematic quality of Hollywood movies to enhance the plot and bolster the in-game storytelling experience. First-person shooters have been able to pull this off with great success using scripted cutscenes, but RTS games typically lack the powerful graphics engines required to convey a visually convincing narrative. This shortcoming is nullified in *Company of Heroes*, which not only is the best-looking strategy game to date, but also has the most engrossing real-time strategy campaign we've ever played.

Developed by Relic (the makers of *Homeworld* and *Warhammer: Mark of Chaos*), *CoH* tells the story of Able Company's battle through World War II, as Allied forces wrested control of Europe from the Axis. The 15-mission single-player campaign stretches from the beaches of Normandy deep into German territory as you liberate and defend important towns, secure roads for convoys, and destroy hidden Axis weapon depots.

All of this is presented with a combination of animated intro movies and stunning in-game cutscenes. The proprietary Essence engine is able to render character models and animations with a truly astonishing level of detail, which Relic combines with Spielberg-worthy cinematography to create a degree of empathy for the characters that we've never felt in an RTS. Seeing the terrified looks on your men's faces when they're ambushed by a sniper really adds to your emotional investment in the game.

Individual maps are divided into many territory fragments. Capturing each one accelerates resource accumulation and expands your front lines. While this may sound simple on paper, the execution allows for an incredibly complex array of strategies and combat approaches. Taking control of roads can effectively split an enemy's resource input in half, and garrisoning riflemen and heavy infantry in buildings provides ample support for key control points.

We were most impressed by how dynamic battles were in-game. The rock-paper-scissors method of combat is still in play, but players can turn the tide at any time with creative use of the battlefield. Tanks will devastate buildings and foot soldiers, but well-placed mortars, mobile artillery, and mine fields will halt any armor advance. Units can also pick up any weapon dropped by enemies, or alternatively upgrade to higher classes of munitions with experience. We had a blast lobbing grenades into windows, throwing sticky bombs on tire treads, and dropping paratroopers behind enemy lines. The fighting never lets up, and there are plenty of ways to send Nazis screaming home to their mommies.

CoH also employs the Havok 3 physics engine to ensure that bodies and buildings blow up as nature intended. Almost every vehicle, building, and tree is destructible with realistic damage modeling—we love watching trucks spin out of control and smash fiery holes in city walls. Other little nuances such as a diverse range of verbal taunts and dramatic death animations augment the gritty war setting.

Only in multiplayer can you fight as the Axis, as the game lacks an Axis campaign or any tutorial for that side. Relic's online matchmaking system is smooth and easy to use, but we would've appreciated more setting options when hosting multiplayer rounds. *CoH* is also very technically demanding, so it's a great excuse to upgrade your system. For SLI users, be sure to install the latest patch to fix a performance problem with dual videocards.

Even if you're tired of WWII games, *Company of Heroes* is worth playing. It's undoubtedly one of the best strategy games ever released. There are few better ways to spend 50 dollars.

—NORMAN CHAN

Town squares are important to defend because they connect multiple territories.

COMPANY OF HEROES

SUPPLY LINES

Unrelenting combat, nail-biting strategic missions, and brilliant visuals and physics effects.

COCAINE LINES

No Axis campaign or tutorial.

9

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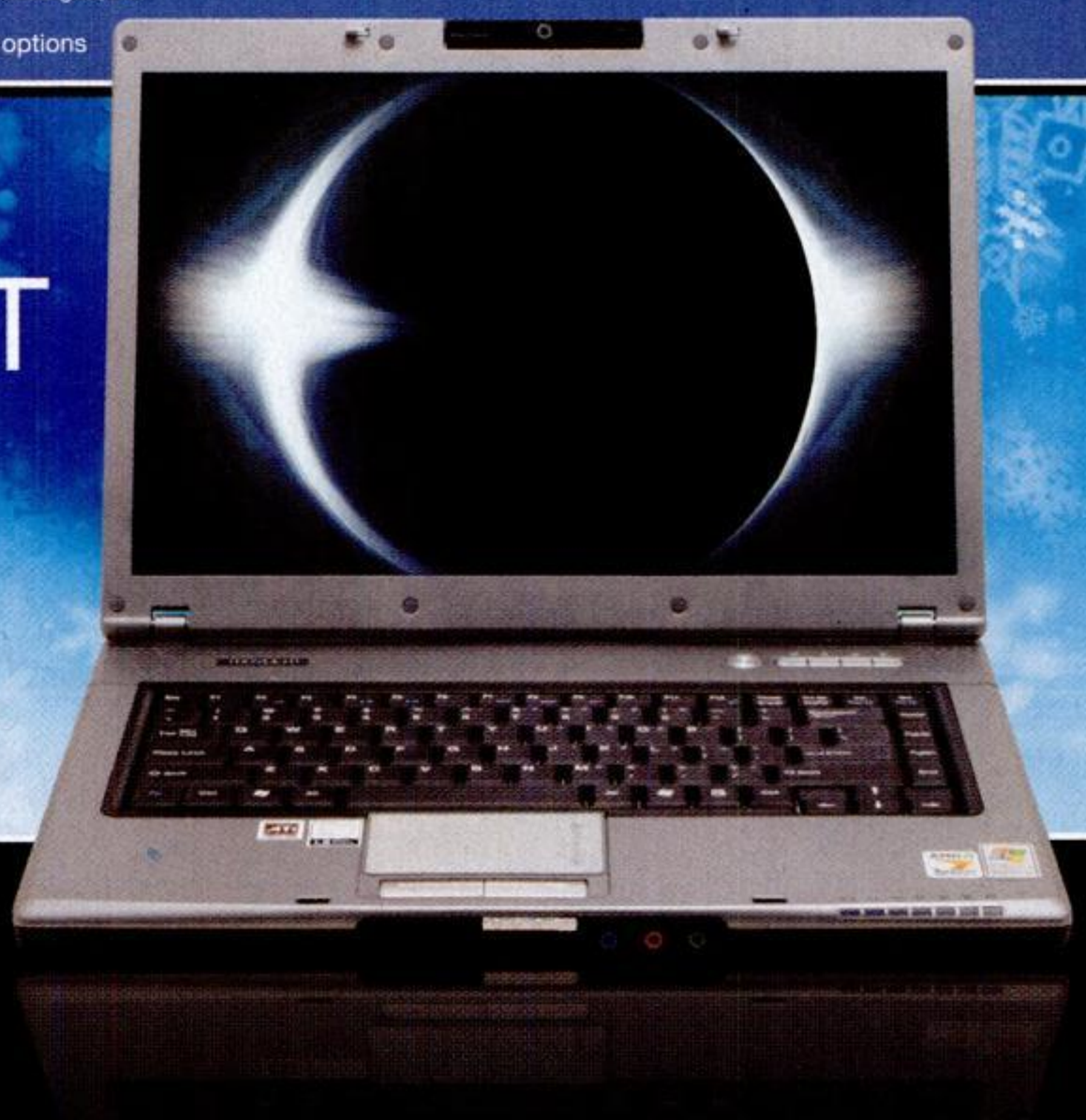

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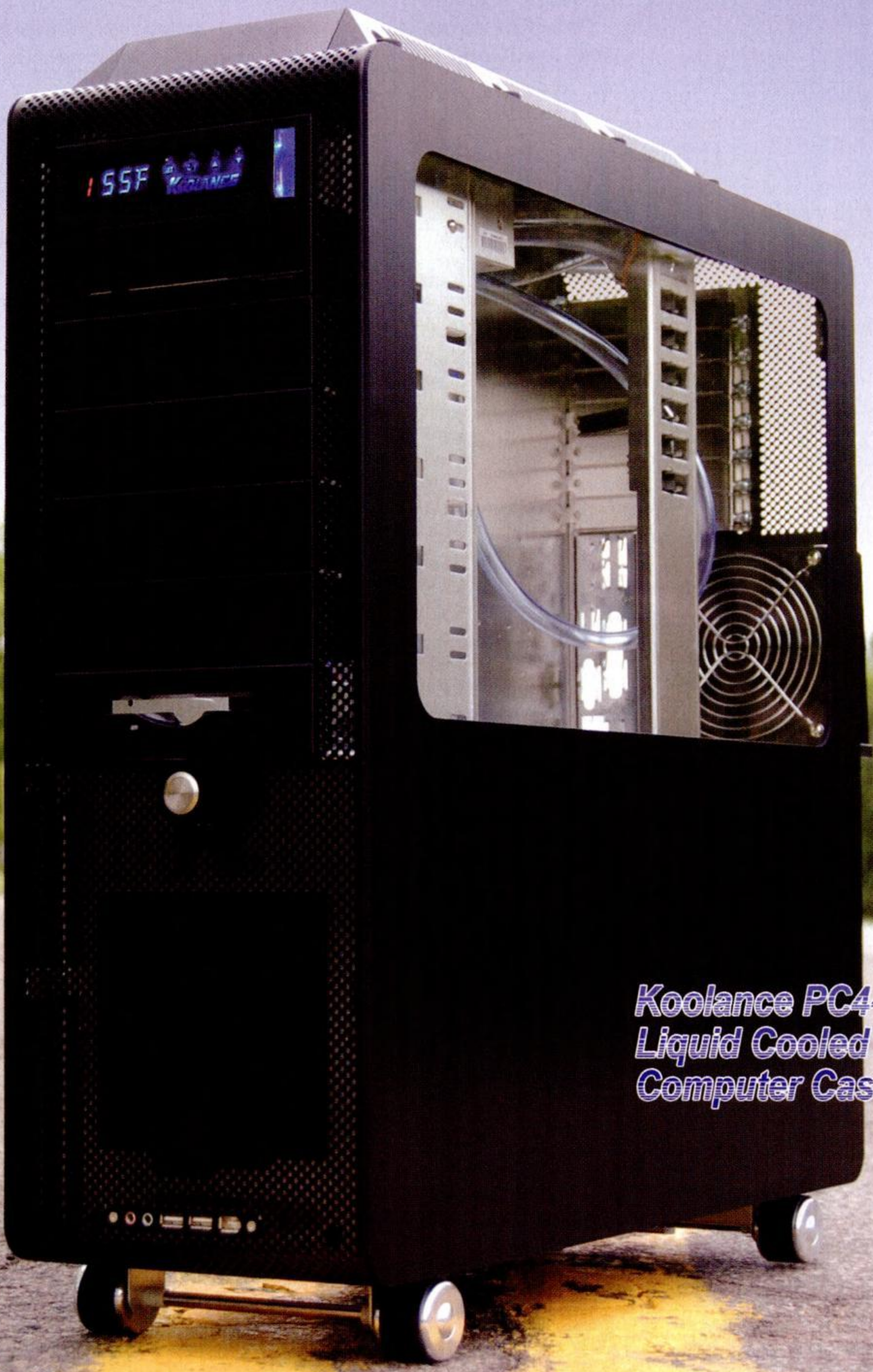

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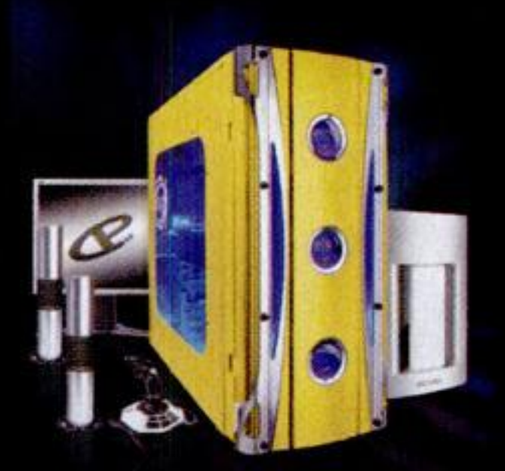

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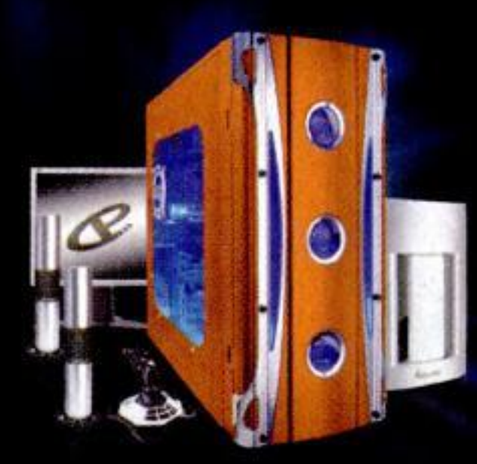

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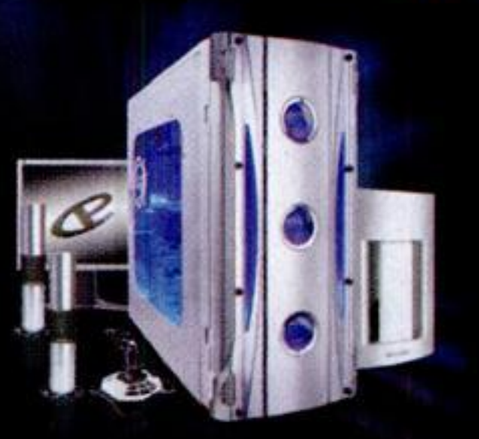

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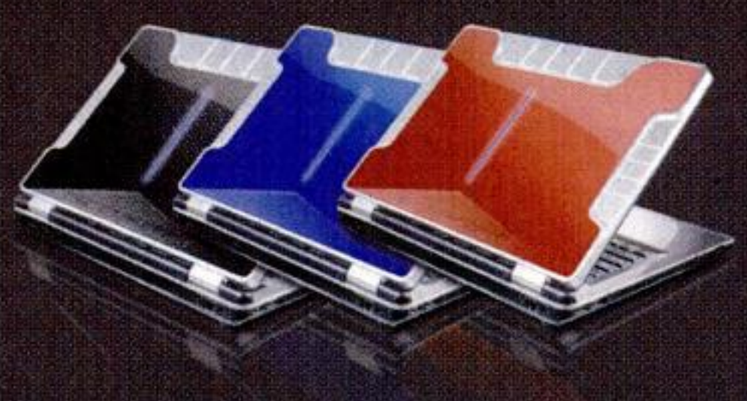

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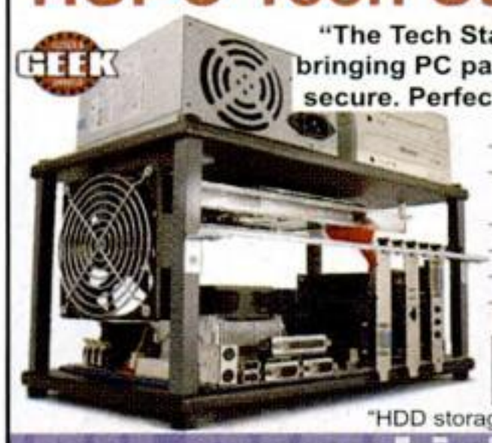

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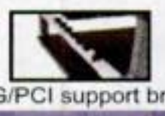
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TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to rig@maximumpc.com. Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) October 15, 2006, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the January 2007 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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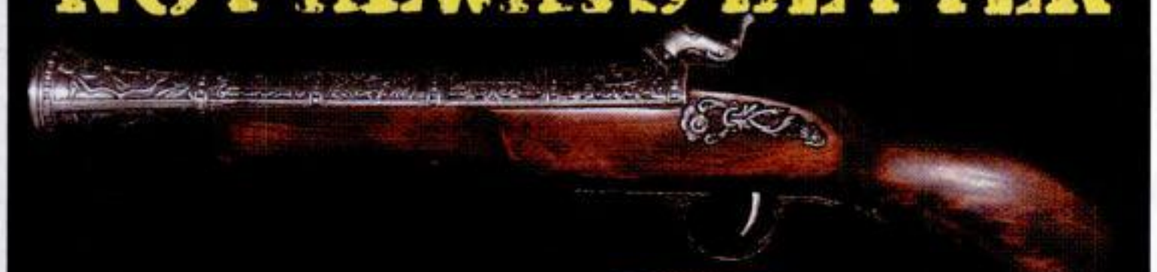

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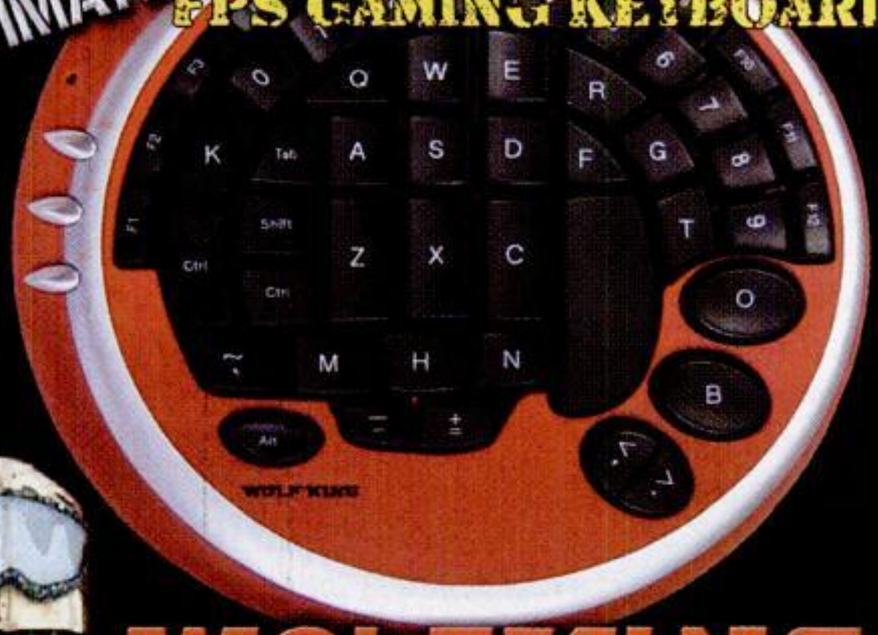

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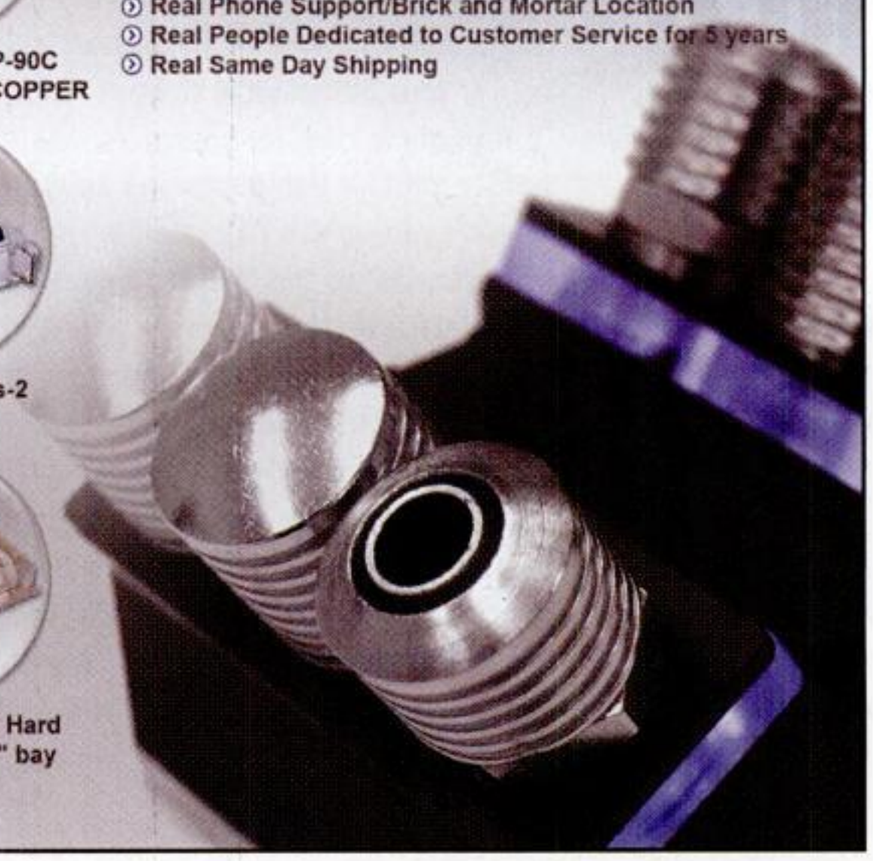

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We tackle tough reader questions on...

✓Satellite TV ✓Direct3D 10 ✓DIY Laptops ✓Typos ✓Paxton vs. Shatner

SQUARE PEGS

I purchased a Dell XPS 400 this summer, which has a BTX motherboard, and now I'm looking into aftermarket cases. The few BTX cases I've been able to find either don't meet my expectations or are too expensive. Do I have to shell out the cash for a satisfactory BTX case, or can I tweak an ATX case to accommodate my mobo? Or maybe you can tell me about some decent, inexpensive BTX cases that might be hiding from me.

—Zack Stadtmueller

SENIOR EDITOR GORDON MAH UNG RESPONDS: I wouldn't bother with your project unless you're a masochist. We haven't seen a cool aftermarket BTX case yet, and converting an ATX case to fit a BTX motherboard would result in an ultimately underwhelming case mod. You will find more BTX and ATX/BTX combo cases out there, if you look long and hard enough, but is it really worth the effort? What's more, Dell has a history of using "better" proprietary power supplies, so you might have to move that into your new case, too. It would likely be easier and less expensive to build a second machine using a cool ATX case of your choice than trying to force that square peg into a round hole.

CRYSTAL BALLS

I'm neither an Nvidiot nor an ATI fanboy, I just want the best GPU for my buck, and for the games and displays that use that investment. Being nonpartisan, I'm alarmed by AMD's buyout of ATI; however, I'm also curious about and hopeful for the upcoming new generation of DirectX graphics.

As much as we all love SLI, I predict multiple GPU cores on a single card with—dare I say it—swappable graphics memory will present a cleaner image than cramming more PCBs into already cramped cases. SLI was the catalyst (heh), but it's time to streamline. I'm hoping that AMD will hit ATI with its multicore know-how. Do I really have to wait until next spring to find out where the industry is headed? What do you guys know?

—Travis Sheehan

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: We were hoping to glean some details about ATI's and Nvidia's plans for the "Technology Preview" story in this issue (page 24), but neither company was willing to share much information. ATI opened its kimono a wee bit more than Nvidia by telling us its next-gen part will feature a unified shader architecture—i.e., the same processing units will execute vertex, pixel, and geometry shader instructions. On the other hand, Nvidia full-on flashed us with a commitment to ship its first Direct3D 10 part in time for the Christmas holiday. So you won't have to wait until next spring for some things.

I'D RATHER BUILD IT MYSELF

I was thrilled by the story you published on DIY laptops a few months ago (April 2006), because it's something I've wanted to do for a while. The components I'd like to use include at least a 2.0GHz Merom CPU, an MXM-compatible motherboard, a 15-inch display, and lots of ports. I was also

Can't Get There from Here

I'm planning to build my ultimate Media Center PC, just as you described in your October 2006 issue, but there's one item I don't fully understand. I will be integrating the PC with my digital satellite receiver and installing two tuner cards, so I can record more than one show at the same time. I realize the IR blaster will control the satellite receiver, but how can I get the receiver to output two video streams at the same time, so my tuner cards can digitize them?

—Chris Luczynski

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: You've identified a big problem, Chris, and I can offer only an imperfect solution: You'll need a dual-tuner satellite receiver that's capable of supporting two TVs (or alternatively, two separate satellite receiver boxes), which means you might be out of luck if you're a DirecTV subscriber—I don't believe they offer any such equipment. Dish Network does, with the Dish 322 and Dish Player-DVR 625 (both for standard-definition TV), or the ViP622 DVR pictured here (for HDTV, although only one of the tuners is high-def). The second tuner in each of these models, however, is controlled by a UHF remote, which means you can't control it with an IR blaster.

If your objective is to burn recorded TV programs to disc for your personal library under the Fair Use doctrine, I suppose you could synchronize the satellite receiver and your PC so the DVR module records to its internal hard drive while your TV tuner simultaneously captures and digitizes its output to your PC's hard drive. Alternatively, you could copy the recordings to your PC in real time after the fact. The ViP622 also has a USB 2.0 port that can be used to digitally transfer content to a PocketDISH handheld device. I know nothing about how it works, but there might be a way of co-opting that port to transfer files to a PC, instead.

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thinking about integrating RAID. But I've become frustrated in my web-search efforts. Can you suggest some sites I might use to source these parts?

—Nathan Steere

SENIOR EDITOR GORDON MAH UNG RESPONDS: The DIY notebook thing is moving along much slower than we'd hoped. Many manufacturers still haven't figured out how to handle the warranty issues associated with consumers breaking notebooks while building them. The online distributor Directron.com stocks quite a few bare-bones kits. Several of these support Intel's 945 chipset, which should be drop-in compatible with Merom. Agearnotebooks.com also sells a healthy assortment of white-books. As for RAID, that technology is generally confined to very large desktop-replacement notebooks.

ME TALK PRETTY ONE DAY

I had to laugh at the screenshot in October's "In the Lab," which displays a Blu-ray drive error message that reads: "Your display enviroment [sic] does not support proteced [sic] content playback." I did a double-take because I couldn't believe there would be not just one, but two misspelled words in a nine-word message.

— Cliff Huizenga

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: Well, they say people who live in glass houses shouldn't throw stones—yes, we occasionally commit the sin of the typo—but as you point out, they had only nine words to check. I guess the DRM scheme in these next-gen optical disc players is even more brain-dead than we first thought.

SPACE: THE FINAL FRONTIER

*In a recent issue you gave the Digital Storm Twister Ultra 4 a "sparkling" 5 verdict [October 2006], but you characterized its positives as "Bill Paxton" and its negatives as "Bill Shatner." Are you sure you had this right? Shatner is a god among actors. Paxton was first noticed playing Chet in **Weird Science**, and he was equally brilliant in **Aliens**; but then he ended up as the lead in **Twister**. He was also seen briefly in **Titanic**, and he had a one-line role in Schwarzenegger's **Commando**. Where is he now? Nowhere.*

*Shatner, on the other hand, currently stars in TV's **Boston Legal**. He formerly starred in both **TJ Hooker** and, of course, the **Star Trek** series and movies. Shatner has also performed Shakespeare, he worked with huge stars like Spencer Tracy and Burt Lancaster, and he played the lead in the absolute best **Twilight Zone** episode: "Nightmare at 20,000 Feet." Clearly, Shatner should have been the plus and Paxton the minus.*

—Ralph Boerke

CAPTAIN GORDON T. UNG RESPONDS: Make no mistake... I am actually a... really big fan... of William Shatner's... work. But... I think Shatner's larger-than-life... persona... has made him an easy... target... to poke fun at.... Besides, haven't you seen Bill Paxton's... inspiring performance... as a... polygamist... in the HBO series... *Big Love?*

BENCHMARK BOGGLE

In each issue, you have a page titled: "How We Test: Real-world benchmarks. Real-world results" [In The Lab], which clearly outlines which tests you use and all the very good reasons for using those benchmarks. Consistency, thou art a jewel.

*So I read the great article on testing Quad SLI [November 2006], scan to the end of the article looking for the benchmarks, and... nope! None of your standardized benchmarks are there. No **SYSmark**, no **Photoshop**, no **Nero**, and no **Quake 4** or **FEAR**.*

—Sam Chase

SENIOR EDITOR GORDON MAH UNG RESPONDS: The "How We Test" section describes how we test full systems for review. Our component benchmarks are different because they're designed to isolate the performance of a specific subsystem, be it graphics, storage, CPU performance, and so on. You'd buy or build a quad-SLI system to accelerate 3D applications, so it simply doesn't make sense to use *Photoshop*, *Premiere*, *SYSmark2004 SE*, or *Nero* to test it because those are all 2D applications. We did test with *FEAR* after our *3DMark05* results lead us to wonder if something was wrong. The result? Quad lost to SLI. MPC

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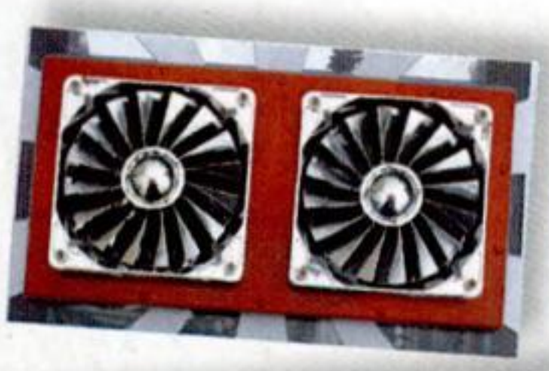
JOHN MANGUS'

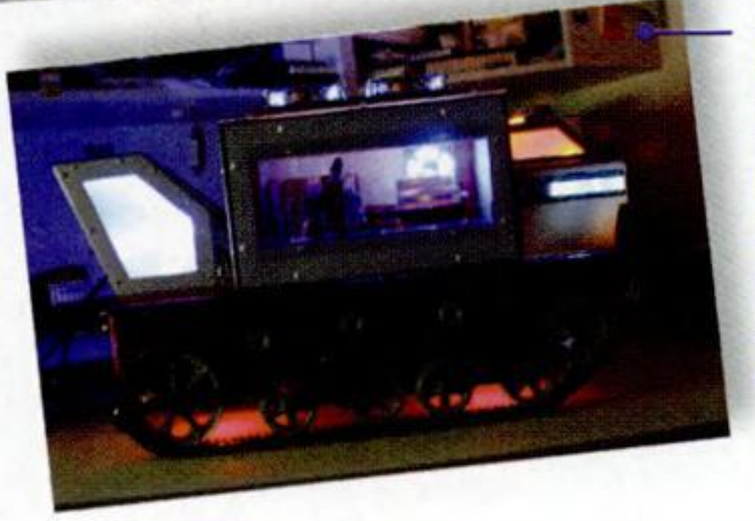
RC PC

We've seen plenty of PCs stuffed into miniature vehicles, but until now none has actually been able to take to the road, much less navigate a rocky hillside if need be. Thanks to its battle-bot drive system with fully functional suspension and a 12V battery, John Magnus' RC (remote-controlled) PC can roll on any terrain for a full 30 minutes before needing a recharge.



The case is made of 14-gauge aluminum that Mangus hand cut, TIG welded, and powder coated into shape.

A retractable handle—once part of an old laptop case—and a set of rear dolly wheels provide a "handy," alternative form of transport.



The RC PC isn't just about road ruggedness; it's equal parts LAN partier, and it can bring on the bling at a moment's notice.

Taking up the rear is a WD RaptorX hard drive supported by a custom-bent frame and situated above a 700W external power supply.

For his winning entry, John Mangus wins a $500 gift certificate for TigerDirect to fund his modding madness! See all the hardware deals at www.tigerdirect.com, and turn to page 100 for contest rules.

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